DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

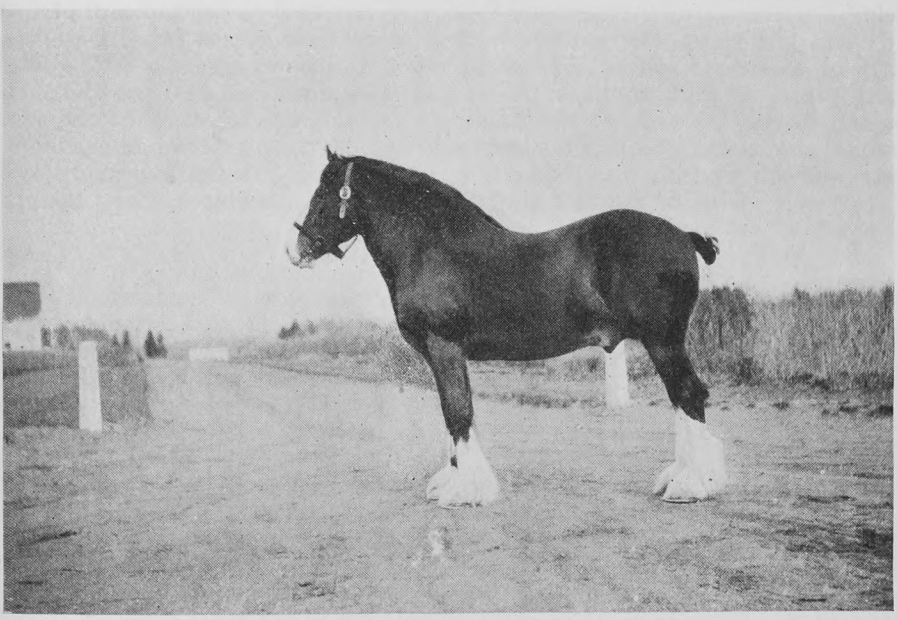
EXPERIMENTAL STATION

LACOMBE, ALBERTA

REPORT OF THE SUPERINTENDENT

F. H. REED, B.S.A.

FOR THE YEAR 1930



His Majesty" (24616) Clydesdale stallion at the Dominion Experimental Station, Lacombe, Alberta.

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DOMINION EXPERIMENTAL STATION, LACOMBE, ALBERTA

SEASONAL NOTES

The year 1930 was unusual in many respects. Spring opened with very fine warm weather which resulted in spring work starting on the land earlier than usual. Ploughing started on the high early land of the district as early as April 1. Field work at the Station started on April 7 but very little seeding was done until April 21. Practically all cereal crops were seeded by May 1, about ten days earlier than the average and under ideal conditions. Germination was strong with prospects very promising. Very dry weather continued throughout May and June. Exceptionally high winds on June 12, 13, 14 and 16 damaged some of the experimental plots to the extent that any experimental data secured would be of little value. Cutworm damage during June was accentuated by the prevailing dry weather. Showers during June 19, 20 and 21 totalled 1·09 inches of rain which temporarily relieved the situation. Wheat heading was general by July 7 with alfalfa being harvested by July 8. Showers during the latter part of July stimulated a second growth in all cereals. While these late showers did not materially improve the yield of wheat, the second growth increased the yield of both barley and oats and relieved what would otherwise have been a decided feed shortage in the district. While seeding was completed earlier than usual, these late July showers and the second growth resulted in a harvest at least ten days later than usual.

The growing season was exceptionally free from late spring and early fall frosts. The absence of killing frosts in the fall made it possible to ripen sufficiently for feed, early maturing oats seeded as late as July 1. Heavy frosts accompanied by some snow during the middle of October did serious damage to cabbage and other unharvested garden crops. This cold weather was followed by warmer weather and brought sunshine which continued to the new year. Chinook winds occurred nearly ever day from October 18 to the new year.

METEOROLOGY

Meteorological factors exert a marked influence on the agriculture of central Alberta. As the soil in central Alberta is suitable for any type of diversified farming, the problems in crop production are nearly all the direct result of climatic limitations. Since the farmer has no control over the climate, all farm operations should be modified to obtain maximum results under these conditions. A complete study of the climatic limitations of a district should form the basis of all farming activities. The meteorological data compiled at this Station, covering as they do a 23-year period, may be taken as a fairly safe criterion of what may be expected throughout central Alberta.

The meteorological instruments at the Station are situated on a gentle slope with a southeastern exposure. Damage by late spring and early fall frosts in the valleys and the absence of this damage on the hills, indicate that there is as great variation in the climate within a ten mile radius—particularly temperature—as there is between Calgary and Edmonton, possibly including the Peace River district.

Meteorological observations have been taken at this Station since 1908. A summary of the data obtained during this period will give a general knowledge

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of climatic conditions prevailing over central Alberta in the past and will form a basis for estimating what may be expected in the future. This knowledge of the climate of the district is important, for upon the general weather conditions prevailing throughout the year, and particularly throughout the growing season, depends the kind and in a large measure the quantity and quality of the crops produced.

The current year's meteorological records are summarized in the accompanying table:—

MONTHLY METEOROLOGICAL RECORDS FOR THE YEAR 1930

Month	Mean temperatures	Maximum temperatures	Minimum temperatures	Precipitation	Number of days on which precipitation occurred	Bright sunshine	Wind	Evaporation
	°F.	°F.	°F.	in.		hours	miles	in.
January	−1·45	30·0	−51·0	0·20	8	109·4	5,209	.....
February	22·18	55·0	−15·0	0·17	6	122·4	4,524	.....
March	26·19	62·0	−11·0	0·22	7	209·9	5,837	.....
April	43·10	75·0	19·0	1·22	7	209·9	5,569	1·511
May	47·23	76·0	21·0	1·61	16	218·7	6,730	2·965
June	56·43	87·0	32·0	2·08	18	252·5	5,961	3·465
July	62·61	97·0	39·0	3·72	21	335·6	4,335	4·229
August	61·36	89·0	32·0	2·93	17	312·9	3,812	3·768
September	49·80	83·0	29·0	1·19	12	179·0	3,798	1·699
October	35·00	75·0	− 6·0	0·85	7	127·4	4,124	0·487
November	28·03	63·0	− 7·0	0·35	4	83·2	3,746	.....
December	24·49	48·0	1·0	0·30	4	88·3	3,033	.....

TEMPERATURES

The activity of all living substances, whether plant or animal, is greatly influenced by temperature. Cold retards all vital processes till at given temperatures they practically cease, and if carried to the extreme, the tissue is frozen and killed. Warmth speeds up these processes until at certain degrees of heat life terminates. The plant has no power to change its environment and but limited power of control over its own temperature. A crop growing in the open fields is subject to all the climatic changes and grows very irregularly—faster on warm days and much slower or not at all on cold ones.

Temperatures must attain a certain level for a definite period of time before a certain plant can attain maturity. Although there is a considerable range of temperatures over which plants will grow and mature, life processes progress at different rates with different temperatures. High temperatures tend to shorten the growing period and conversely low temperatures tend to lengthen the growing period.

The temperature at which the most rapid growth is made varies with different plants. Cereals for grain require more heat than if used for forage, while cereals as a group require more heat than forage crops as a group. Likewise corn requires more heat than hay crops, etc.

Temperature is likewise very influential in animal production. Growth, whether of bone, tissue, or fat, is most rapid at moderate temperatures. Excessive heat causes a condition similar to fever, while an excessive amount of food is utilized in maintaining heat in the body where very low temperatures prevail. Cheaper gains and more thrifty live stock are the rule in mild winters with the opposite the case in cold winters. Very high temperatures during the summer are usually accompanied by a decided falling off in the gains of all live stock unless protection for the animals is provided against the bright sunshine which usually forms a part of such weather and the insect pests which usually accompany it.

MEAN TEMPERATURE

Month	Mean temperature 1930	23-year average	Amount above average	Amount below average	Highest since 1908 and year	Lowest since 1908 and year
January	−1·45	8·57	.....	10·02	21·5 (1919)	−13·5 (1916)
February	22·18	12·75	9·43	.....	22·18 (1929)	− 0·6 (1909)
March	26·19	21·98	4·21	.....	29·36 (1911)	2·8 (1910)
April	43·10	37·06	6·04	.....	47·56 (1915)	10·3 (1908)
May	47·23	48·63	.....	1·40	54·32 (1928)	44·92 (1920)
June	56·43	55·49	0·94	.....	59·19 (1912)	52·10 (1915)
July	62·61	60·12	2·49	.....	64·09 (1920)	51·46 (1915)
August	61·36	58·17	3·19	.....	63·78 (1915)	53·57 (1911)
September	49·80	48·51	1·29	.....	53·55 (1922)	36·78 (1915)
October	35·00	40·03	.....	5·03	47·70 (1923)	33·24 (1925)
November	28·03	25·68	2·35	.....	39·00 (1917)	10·38 (1927)
December	24·49	13·32	11·69	.....	24·49 (1930)	− 2·18 (1927)
Yearly mean temperature	38·00	35·86	2·14	.....	38·93 (1923)	30·94 (1909)

The mean temperature is the average of the maximum and minimum temperatures recorded and is an indication of the relative temperature for the period in question.

July is the hottest month of the year, having an average mean temperature of 60·12 degrees. The highest mean temperature for any month since records have been kept was attained during July, 1920, when the mean temperature was 64·09 degrees. January is the coldest month with an average mean temperature of 8·57 degrees. The coldest month on record was January, 1916, when the mean temperature was −13·5 degrees.

The highest and lowest mean temperatures indicate the range of mean temperatures one may expect from one year to another. It will be noticed that there is not nearly as large a range between the highest and lowest range in the summer months as during the winter months. August shows the narrowest or smallest range and April the widest or greatest range. In other words, the summer months can be depended on to be warm, while the winter months may be mild or very cold, depending largely on the presence or absence of chinook winds which modify winter temperatures.

An interesting point in connection with the mean temperatures is the fact that June 22 is the longest day of the year but July is the hottest month; and while December 22 is the shortest day of the year, the lowest mean temperatures occur during January.

COMPARISON OF MAXIMUM TEMPERATURES IN 1930 WITH THOSE WHICH WERE REGISTERED IN THE YEARS 1908 TO 1930 INCLUSIVE

Month	Maximum temperatures 1930	23-year average	Amount above average	Amount below average	Highest since 1908 and year	Lowest since 1908 and year
January	30·0	43·96	.....	13·96	54·0 (1928)	27·9 (1916)
February	55·0	50·71	4·29	.....	62·7 (1916)	41·1 (1910)
March	62·0	56·47	5·53	.....	65·6 (1928)	47·5 (1909)
April	75·0	71·16	4·84	.....	83·0 (1923)	50·8 (1920)
May	76·0	80·19	.....	4·19	90·0 (1928)	71·8 (1916)
June	87·0	84·17	2·83	.....	90·5 (1919–25)	75·8 (1915)
July	97·0	88·63	8·37	.....	100·8 (1924)	88·3 (1912)
August	89·0	87·91	1·09	.....	98·0 (1928)	80·0 (1911)
September	83·0	81·31	1·69	.....	90·0 (1923)	74·3 (1915)
October	75·0	75·45	.....	0·45	82·8 (1921)	66·0 (1925–28)
November	63·0	58·20	4·80	.....	69·8 (1908)	43·4 (1910)
December	48·0	48·10	.....	0·10	56·0 (1928)	32·8 (1914)

The maximum temperatures registered during 1930 agree fairly closely with the mean temperature in that January was decidedly below the average while the remainder of the winter months were above the average.

It is interesting to note that there are two Januarys recorded in the past 23 years in which the temperature never was above freezing. The highest temperature recorded in January, 1930, was 30·0 degrees and January, 1916, 27·9 degrees. All the other winter months recorded had certain days during which the temperature was above freezing; on the other hand there were innumerable days when the highest temperature recorded was below zero.

The highest temperature recorded was on July 2, 1924. The highest temperatures recorded indicate what is possible and the average indicates what may be expected.

Comparison of Minimum Temperatures in 1930 with Those which were Registered in the Years 1908 to 1930 Inclusive

Month	Minimum temperature 1930	23-year average	Amount above average	Amount below average	Highest since 1908 and year	Lowest since 1908 and year
January	−51·0	−37·12	.....	13·88	— 4·6 (1919)	−56·1 (1909)
February	−15·0	−30·75	15·75	.....	— 6·5 (1915)	−47·6 (1909)
March	−11·0	−17·50	6·50	.....	— 1·0 (1915)	−38·1 (1919)
April	19·0	7·66	11·34	.....	22·3 (1911)	−24·1 (1920)
May	21·0	20·40	0·60	.....	32·0 (1915)	−11·9 (1911)
June	32·0	29·81	2·19	.....	36·7 (1911)	22·9 (1913)
July	39·0	34·45	4·55	.....	39·3 (1914)	29·8 (1917)
August	32·0	31·79	0·21	.....	41·0 (1915)	26·5 (1908)
September	29·0	21·24	7·76	.....	29·0 (1930)	5·5 (1926)
October	— 6·0	7·64	.....	13·64	20·0 (1914)	−11·5 (1925)
November	— 7·0	— 9·70	2·70	.....	11·4 (1917)	−34·6 (1919)
December	1·0	−27·7	28·7	.....	1·0 (1930)	−57·0 (1924)

The minimum temperatures are interesting in that they show the extreme low temperatures possible and indicate certain crop limitations which prevail in central Alberta.

The year 1930 was unusual in that January was one of the coldest months recorded at the Station, while December was one of the warmest. December, 1930, was the only December in which the temperature did not drop as low as zero. The highest minimum temperatures indicate that it is quite possible to have a relatively mild winter as well as a very cold one. On the other hand, the relatively low minimum temperatures during the summer months assure an absence of sultry weather.

In studying the minimum temperatures recorded at this Station the reader should keep in mind that the averages represent the lowest temperatures which may be expected each month and that the lowest temperatures recorded may be considerably above or below the average. For example, the average minimum temperature for June is 29·81 degrees, but it may drop as low as 22·9 degrees as indicated by the lowest minimum or it may not go any lower than 36·7 degrees the highest minimum temperature recorded.

The 23-year averages indicate that July is the only month we can expect to be reasonably free from frosts of any kind. Records show that temperatures of 32·0 degrees or lower were recorded on 6 out of 23 years during July, 19 out of 23 years during June, and 14 out of 23 years during August. One not familiar with the agricultural problems of Central Alberta might infer that it would be impossible to produce crops of any kind under such conditions. Such is not the case as many farm and garden crops grow to perfection and are uninjured by these light frosts unless they occur at a critical period in the growth of the crop. As a rule the early fall frosts do most damage by lowering both the

yield and grade of cereals. Cultural practices and variety improvement have done much to alleviate this situation. Early ripening crops are usually in the stook before late August frosts occur.

PRECIPITATION

Precipitation is a very important factor in agriculture as all plants and animals require a certain amount of moisture to carry on their life processes. The amount of moisture stored in unirrigated soils is dependent largely on precipitation, and in turn on the water holding capacity of the soil and the run off. While yields per acre are not in direct proportion to the amount of precipitation, the fact remains that high yields are seldom possible without a reasonable amount of rainfall.

Moisture which falls in the form of snow does not materially influence crop yields for the reason that a large proportion of this moisture runs off when the snow melts in the spring. Occasionally conditions are such that most of this moisture is retained by a combination of conditions in which the land freezes up with very little moisture in the land and an early snowfall occurs, the frost does not penetrate the soil very deeply and the soil is very porous. If the snow melts slowly in the spring following such conditions most of the moisture is absorbed directly into the soil.

The time when precipitation occurs is of great importance in crop production. That received during the growing season is of greatest value and is accompanied by the least run off. Fortunately sixty per cent of that received in central Alberta occurs during the growing season.

Live stock production is dependent on the precipitation. The availability of drinking water, whether in sloughs, creeks, shallow or deep wells is dependent to a greater or less extent on rainfall, while the production of forage crops is wholly dependent on rainfall.

COMPARISON OF MONTHLY PRECIPITATION IN 1930 WITH THAT RECEIVED DURING THE YEARS 1908 TO 1930 INCLUSIVE

Month	Precipitation 1930	23-year average	Amount above average	Amount below average	Highest since 1908 and year	Lowest since 1908 and year
January	0·20	0·84	.....	0·64	5·30 (1918)	0·20 (1930)
February	0·17	0·63	.....	0·46	1·27 (1927)	0·17 (1930)
March	0·22	0·68	.....	0·46	2·08 (1927)	0·13 (1912)
April	1·22	1·17	0·05	.....	2·61 (1921)	0·04 (1910)
May	1·61	1·87	.....	0·26	3·44 (1926)	0·48 (1913)
June	2·08	3·32	.....	1·24	8·49 (1915)	0·8? (1924)
July	3·72	2·80	0·92	.....	5·29 (1912)	0·63 (1929)
August	2·93	2·54	0·39	.....	5·22 (1916)	0·38 (1920)
September	1·19	1·63	.....	0·44	3·86 (1926)	0·31 (1908)
October	0·85	0·67	0·18	.....	1·36 (1917)	0·0 (1921)
November	0·35	0·75	.....	0·40	2·13 (1927)	0·0 (1908–17)
December	0·30	0·69	.....	0·39	2·42 (1927)	0·0 (1915)
Totals	14·84	17·59	.....	.....	43·47	3·16

The total precipitation during 1930 was 14·84 inches, which is 2·75 below the average of 17·59 inches for the past 23 years. Since there was practically no moisture carryover from the previous year and since the amount of moisture received during May and June was below the average, hay and early maturing grain crops were considerably below normal in production. Late maturing crops such as oat green feed, second growth alfalfa, potatoes and silage crops were equal if not above the average as a result of the extra moisture received during the latter part of July and August.

The totals show that if a season representative of all the wettest months recorded were to occur, that we might have a wet season with 43·47 inches of precipitation, or a dry season with 3·16 inches only. While the occurrence of such seasons is highly improbable the records show that it is not impossible. The driest year which has actually occurred since 1908 was 1920, with 12·41 inches precipitation and the wettest year was 1927 with 25·17 inches.

It will be observed that most of the precipitation occurs during the summer. Over 66 per cent occurs during the growing season of April, May, June, July and August, and 76 per cent if we include September for silage crops and roots.

A large amount of the rainfall during the growing season is received from showers. This is especially true in the dry seasons. Under such conditions many of them are too light to be of any real value; while they add to the total precipitation received, they do not add to the moisture content of the soil as they do not penetrate the soil to any depth and quickly evaporate.

In many cases showers following a continued dry period, where all available moisture is exhausted to a depth of two or three feet, actually do more harm than good, unless they are sufficiently heavy to develop additional growth. Frequently these showers merely develop a surface or shallow root system which causes the plant to wilt more quickly when this limited moisture is exhausted.

SUNSHINE

The importance of sunshine in agriculture is being appreciated to a greater extent as researches reveal its functions. Not only does the sun generate the heat without which the vital processes of both plants and animals would be impossible, but the rays of the sun have a stimulating and beneficial effect on both plants and animals. Normal growth of plants and animals is impossible without exposure to a certain amount of irradiation from the sun's rays. Farmers are all familiar with the benefits resulting from sunshine manifest in the increase in egg production towards spring, and the larger gains made by feeder cattle and hogs in a warm bright sunshiny winter as compared with a cold cloudy one.

Too much sunshine has a deleterious effect as shown by sunburn on white hogs, sunscald on fruit trees, etc.

COMPARISON OF THE MONTHLY HOURS' DURATION OF SUNSHINE IN 1930 WITH THOSE REGISTERED DURING THE YEARS 1908 TO 1930 INCLUSIVE

Month	Sunshine duration 1930	Average sunshine duration 1908–1930	Amount above average	Amount below average	Average daily sunshine duration 1908–1930
	hours	hours	hours	hours	hours
January	109·4	86·1	23·3	.....	2·78
February	122·4	125·1	.....	2·7	4·45
March	209·9	165·6	44·4	.....	5·34
April	209·9	210·5	.....	0·57	7·02
May	218·7	240·9	.....	22·2	7·77
June	252·5	256·5	.....	4·0	8·55
July	335·6	296·5	39·1	.....	9·56
August	312·9	261·8	51·1	.....	8·45
September	179·0	190·3	.....	11·3	6·34
October	127·4	141·0	.....	13·6	4·55
November	83·2	108·1	.....	24·9	3·60
December	88·3	84·7	.....	3·6	2·73
Totals	2,249·2	2,167·1	.....	.....	.....

Sunshine is closely associated with certain weather phenomena in Central Alberta. Very cold weather such as occurred in January, 1930, is usually accompanied by a clear sunshine, while mild winter weather resulting from chinook winds is usually accompanied by a lack of sunshine due to the clouds which form a part of, or constitute the chinook arch. Mild weather during the fall and spring months is usually accompanied by bright sunshine since the cold and warm air currents which form the clouds of the chinook arch do not function in the same way.

It will be noted that average hours of sunshine per month and per day is least in December and January and gradually increases up to July and decreases again each month up to December. The sunshine is not only of shorter duration during the winter but the rays strike the earth's surface at a much more acute angle, hence have their power distributed over a much larger surface per unit. In other words one hour's winter sunshine is not nearly as effective in stimulating vital processes as an hour of summer sunshine.

EVAPORATION

Evaporation data have been recorded for the eight year period 1923 to 1930 inclusive. An evaporation tank is sunk in the ground so that the water surface is approximately level with the surface of the soil. Instruments are available to take readings to one-thousandth of an inch. These readings are taken and recorded each day.

The humidity and temperature of the atmosphere, and the velocity of the wind influence the rate of evaporation. Very little evaporation occurs during a rainy period when the atmosphere carries a high humidity or is highly saturated with moisture, or in the late fall or early spring when low temperatures prevail. Evaporation is most rapid during hot dry periods in the summer and is accentuated by the occurrence of winds during such weather.

COMPARISON OF MONTHLY EVAPORATION IN 1930 WITH THAT WHICH OCCURRED DURING THE EIGHT-YEAR PERIOD 1923 TO 1930

Month	Evaporation 1930	Average evaporation 1923–1930
	in.	in.
April	1·511	1·532
May	2·965	3·391
June	3·465	3·468
July	4·229	4·696
August	3·768	3·412
September	1·699	1·922
October	0·487	0·780
Totals	18·124	19·201

It will be seen that the greatest evaporation occurs during the hot days of July and that the least occurs during the early and late summer months. It is also interesting to note that the evaporation from a free water surface is slightly in excess of the average annual precipitation.

WIND VELOCITY

Wind is a more important factor in agriculture than is generally appreciated. Chinook winds modify winter temperatures while severe hot winds during the growing season do considerable damage to growing crops. High winds at periods when the soil is unprotected by snow or growing crops may do damage by removing considerable portions of the rich surface layer off the soil. The direction and velocity of our winds control in a large measure the kind of climate in which we live.

COMPARISON OF WIND IN 1930 WITH THAT RECORDED DURING THE YEARS 1923 TO 1930 INCLUSIVE

Month	Miles wind travelled in 1930	Average number of miles wind travelled 1923-1930	Number of miles from each direction in 1930							
	miles	miles	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
January	5,209	4,660	516	145	116	189	1,085	18	1,427	1,713
February	*4,524	*4,524	113	141	17	102	1,089	183	410	356
March	*5,837	*5,837	66	227	66	357	1,944	178	937	782
April	5,569	5,952	160	728	43	2,016	1,128	334	615	545
May	6,730	6,527	165	497	70	2,235	529	412	1,012	1,810
June	5,961	5,802	61	874	84	967	685	1,214	568	1,508
July	4,335	5,087	54	857	364	607	800	1,061	467	125
August	3,812	4,464	65	487	432	662	1,066	511	533	56
September	3,798	5,118	163	337	489	632	440	993	278	466
October	4,124	4,736	178	19	139	855	1,131	281	566	955
November	3,746	4,638	367	26	11	764	972	451	545	610
December	3,033	4,998	51	.....	58	137	1,587	614	555	31
Totals	56,678	62,343	1,959	4,338	1,889	9,523	12,456	6,250	7,913	8,957

*1923 to 1929 averages used to correct inaccuracies due to instrument breaking down and being repaired.

An unfortunate experience was encountered with the wind recording instruments in February. The clock stopped on February 13 and it was March 5 before it could be replaced. For that reason the seven year average figures 1923 to 1929 are given for the miles the wind travelled in 1930 as well as the eight year average. The number of miles the wind travelled in 1930 during February and March represent only 13 and 26 days respectively for these months.

It is interesting to note that there was an excessive amount of wind from a southerly direction. As a rule most of our fair weather winds are from a westerly direction. The growing season of 1930 was unusual in that it was exceptionally dry during the early half of the growing season. Chinook winds from a southerly direction blew almost continuously from the latter part of October to the end of the year with the result that this period was one of the mildest on record.

The amount of wind during May and June was above the average and resulted in an excessive amount of soil drifting and blown-out crops. The late summer and fall months had much less wind than usual accompanied by relatively high temperatures. This phenomenon was most pronounced in December.

ANIMAL HUSBANDRY

HORSES

On January 1, 1931, there were 38 horses in stock, including 13 pure-bred Clydesdales, 13 Shire-Clydesdale cross-breds, 4 grade Clydesdales, 2 pure-bred hackneys, 2 thoroughbred hackney cross-breds, 2 thoroughbreds, 1 driving mare and 1 Clydesdale stallion, "His Majesty".

The idle work-horses, colts over a year old, and some brood mares, are wintered in the open with a good bush for shelter. Water is always available in a trough with a tank heater. The feeds used for the most part, consist of oat green sheaves, oat straw and hay of various kinds. The oat straw is available to the horses constantly from large racks, and the oat green feed and hay are fed on the ground in such quantities as will be cleaned up daily without waste. Some hay is fed to give a little variety to the ration. Horses handled in this manner come through the winter in good hard condition for spring work.

The feeding of potassium iodide as a preventive for joint-ill was continued. The pregnant dams are given, regularly twice per month, a small teaspoonful of potassium iodide in their oat chop. Six strong healthy foals were born and raised in 1930.

Since the feeding of potassium iodide to brood mares was commenced in 1924, 26 foals have been raised and only 2 cases of joint-ill have occurred. In both of these cases the dams were not in good health.

On March 9, 1930, the imported Shire stallion "Snelston Topper" (1608) (38528), used at this Station for four breeding seasons, died of acute inflammation of the small intestines, resulting from a twist in the bowel, possibly caused during a case of colic.

On April 21, 1930, following the regular policy of transferring sires from one Experimental Station, or Farm, to another, this institution received from the Experimental Farm at Indian Head, Saskatchewan, the pure-bred Clydesdale stallion "His Majesty" (24616). This horse was bred at the Dominion Experimental Farm, Indian Head, where the Dominion Government maintains a large stud of breeding Clydesdales. "His Majesty" is low set, deep bodied and compact, with good size and outstanding breeding, quality and action. Although only rising six he has an enviable record as a breeder, and in the largest shows in America.

In 1925 he was first prize foal at the Regina Summer Fair, and the following year he was again first in his class as a yearling, and Grand Champion Clydesdale stallion of the show. In the fall of 1926 he stood second in a strong class at the Royal Winter Fair, Toronto. At the "International" at Chicago in 1927 he was first in the two-year-old class, and Reserve Junior Champion.

The sire of "His Majesty", Dunure Norman, stood at stud at Dunure Mains, Scotland, along with the famous Dunure Footprint and Auchenflower. Dunure Norman was imported by Ben Finlayson of Brandon, Manitoba. In 1926 he was shown at the Regina Summer Fair, where he was placed first in his class and was Grand Champion Clydesdale stallion of the show.

Doune Lodge Moss Rose, the dam of "His Majesty", was first as a two-year-old at the Regina Summer Fair in 1917. At the 1925 Regina Summer Fair, when 10 years old, she was first prize brood mare and Grand Champion female.

The breeding of both Dunure Norman and Moss Rose traces back to Sir Everard, Top Gallant and Darnley. There is also a double cross of the famous Baron's Pride in the pedigree of both the sire and dam of "His Majesty".

"His Majesty" is kept primarily for use in breeding operations at the Station, and also to be available to farmers in Central Alberta who may be interested in breeding draught horses.

BEEF CATTLE

ABERDEEN-ANGUS

The Aberdeen-Angus herd, at the close of the year 1930 consisted of two herd sires Blackcap of Heather Brook No. 35016 and Earl Eric of Glencarnock No. 32463; one yearling bull, one steer; eight cows, four two-year-old heifers; six yearling heifers; and nine calves, making a total of thirty-one head. This is the identical number reported a year ago. The absence of any increase in numbers in the herd can be accounted for first, by the final disposition of all reactors to the blood test for contagious abortion; second, by the rigid selection and weeding out of females in the process of improving type and quality.

Eleven calves were dropped during the year 1930. Of these eleven calves nine were normal, healthy calves; one was an abortion; and one was seriously deformed. The quality of the normal calves was very good throughout. Of the fourteen calves dropped the previous year, five were abortions, so that satisfactory improvement has taken place in the herd as far as abortions are concerned. All cows which aborted and all animals which reacted to the blood test for abortion have been sold for slaughter and the herd at the last test was found to be free from the abortion bacillus. The herd is free from tuberculosis, having been fully accredited for six years.

The object of maintaining the pure-bred herd of Aberdeen-Angus cattle is to provide a supply of breeding stock to farmers at reasonable prices, and also to supply cattle for feeding and breeding experiments. The blood test has, however, to a great extent, interfered during the past year with sales of pure-bred breeding stock to farmers, and has also left the herd so badly depleted that it has been impossible to carry on much beef cattle feeding experimental work.

Cost of Maintaining Beef Breeding Bulls for One Year

—	Age in years	Oats consumed	Bran consumed	Hay consumed	Green-feed consumed	Total cost of feed for one year
		lb.	lb.	lb.	lb.	$
Earl Eric of Glencarnock	7	1,442	721	4,712	2,610	65 04
Blackcap of Heather Brook	6	1,497	749	4,850	2,750	67 45
Total	13	2,939	1,470	9,562	5,360	132 49
Average	6·5	1,469·5	735	4,781	2,680	66 25

The plan followed for keeping the mature bulls consisted of a box stall for each animal with an adjoining paddock for exercise. This meant that the bulls lived out-doors practically all the time, but, they had ready access to a good comfortable shelter for extremes of either heat or cold.

DAIRY CATTLE

The dairy cattle kept on the Farm are pure-bred Holstein-Friesians. On December 31 there were 32 head of cattle as follows: 2 mature bulls, 5 bull calves, 10 mature cows, 2 three-year-olds, 5 two-year-olds, 5 yearlings, and 3 heifer calves.

Recovering from the setback reported a year ago when all reactors to the blood test for contagious abortion were slaughtered, the herd has been making substantial progress in that there were no abortions or premature births recorded during the year. All the calves dropped were normal and healthy and there was an absence of retained after-births and sterility. There has not been the usual increase in the herd, however, because of the fifteen cows which freshened only three gave heifer calves.

The herd again successfully passed the annual tuberculin test in November and maintained full accredited standing.

The average production of the five cows finishing a lactation period within the calendar year 1930 was 14,513 pounds of milk and 622 pounds of butter for an average milking period of 355 days. One mature cow and one 3-year-old heifer completed 365-day R.O.P. records averaging 16,110 pounds of milk and 646 pounds of 85 per cent butter. Two 2-year-old heifers completed 365-day R.O.P. records averaging 12,369 pounds of milk and 530 pounds of 85 per cent butter.

SALES OF BREEDING STOCK

Owing to rigid selection, and the loss of some very promising young females through the slaughter of all reactors to the blood test for contagious abortion, there were no females available for sale as breeders, the sales being made up of bulls. These sales were for the most part made to farmers purchasing pure-bred sires for the first time and as the bulls were all of good type and breeding they should be instrumental in raising the standard of the dairy herds in the districts to which they were sent.

EXPERIMENTAL FEEDING

Owing to the losses incurred in the herd of milk cows through the slaughter of the reactors to the blood test for contagious abortion there were not sufficient cows to carry on dairy cattle feeding experimental work during the winter of 1929-30. The experimental work was confined to the collecting of cost data respecting the cost of raising bulls to breeding age and the cost of maintaining herd bulls.

COST OF RAISING DAIRY BULLS TO ONE YEAR OF AGE

Number of animals	5
Pounds whole milk consumed per head	1,558
Pounds skim-milk consumed per head	4,171
Pounds meal consumed per head	1,293
Pounds ensilage consumed per head	1,025
Pounds hay consumed per head	1,893
Average cost	$64 50

Feed Prices

Whole milk, per cwt	$ 1 50
Skim-milk, per cwt	0 20
Meal, per cwt	1 50
Ensilage per ton	4 00
Hay per ton	12 00

These bulls were in good condition at the conclusion of the test and were sold for service in small pure-bred and grade herds.

COST OF MAINTAINING DAIRY BREEDING BULLS FOR ONE YEAR

Name of bull	Age in years	Oats consumed	Bran consumed	Hay consumed	Green-feed consumed	Total cost of feed for one year
		lb.	lb.	lb.	lb.	$
Mutual Pontiac Korndyke	6	1,454	726	4,813	2,530	65 55
Strathmore Fairchild Evergreen	8	1,528	764	4,712	2,620	66 66
Total	14	2,982	1,490	9,525	5,150	132 21
Average	7	1,491	745	4,762·5	2,575	66 11

Feed Prices

Oats per bushel	40 cents
Bran per ton	$26 00
Hay per ton (mixed)	$12 00
Greenfeed per ton	$ 8 00

CONTAGIOUS ABORTION

In co-operation with the Pathological Division of the Dominion Health of Animals Branch, eight blood tests for bacillus abortus of Bang, the causal organism of contagious abortion, have been applied to all animals in the Angus and Holstein herds of cattle regardless of age or sex. Tests were made in November, 1928, February, 1929, May 1929, September, 1929, February, 1930, June, 1930, October, 1930, and January, 1931. All reactors to the blood test were slaughtered from time to time and the herds are now on a definite clean footing as indicated by the test. Further blood tests will be made to detect any further evidence of infection.

Close study is being made of the results of the test as related to the actual breeding history of each individual in the herds. From the first two years' results it would appear that the blood test may be looked upon as a reliable guide in the matter of indicating individuals that were harbouring infection.

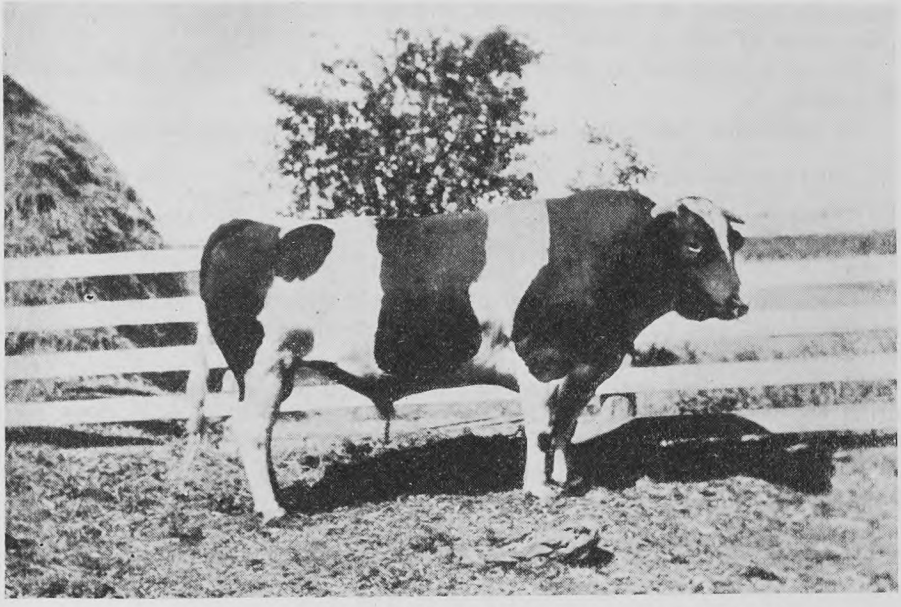
The following is a table which is self-explanatory and indicates the advance that has been made in eliminating bacillus abortus of Bang infection from the herds of Holstein and Angus cattle by means of the agglutination and complement fixation blood tests:—

ELIMINATION OF INFECTIOUS ABORTION BY MEANS OF BLOOD TESTS
(1928–1931)

Date of test	Number of animals	Number negative	Per cent negative	Number positive	Per cent positive	Number questionable	Per cent questionable	Number of reacting animals sold
Nov. 13, 1928	103	57	55·34	33	32·04	13	12·62	17
Feb. 18, 1929	84	44	52·38	28	33·33	12	14·28	12
May 20, 1929	70	40	57·14	20	28·57	10	14·28	.....
Sept. 18, 1929	78	49	62·82	25	29·49	6	7·69	21
Feb. 21, 1930	63	60	95·24	2	3·17	1	1·59	3
June 25, 1930	57	57	100·0	0	0·0	0	0·0	.....
Oct. 16, 1930	56	55	98·2	0	0·0	1	1·75	.....
Jan. 19, 1931	60	60	100·0	0	0·0	0	0·0	.....

BREEDING FOR MILK PRODUCTION

There is a very interesting object lesson in the herd at this Station. Five herd sires have been used in improving the herd and the milk and fat productions of their progeny have been recorded. Royalton Korndyke Count was the first bull used. There is no record available for his dam but it goes without saying that he was a well bred bull from good milking stock or he would never have been imported from the United States. There were five cows in the herd sired by this bull. As mature cows their yearly records averaged 17,847 pounds of milk with an average test of 3·28 per cent. Their dams averaged 14,839 pounds of milk as mature cows with an average test of 2·96 per cent. The daughters of this bull, therefore, averaged 3,008 pounds of milk more than their dams and the milk tested ·32 per cent higher. From the second herd sire, Sir Evergreen Ormsby, there were two daughters in the herd. As three-year-olds these averaged 16,895 pounds of milk testing 3·11 per cent, while their dams



Mutual Pontiac Korndyke (62338) Holstein-Friesian senior herd sire.

as mature cows gave an average of 15,700 pounds of milk testing 3·32 per cent. The next herd sire was Roycroft King Spofford. The four daughters of this bull as two-year-olds have averaged 16,391 pounds of milk testing 3·31 per cent. As mature cows their dams averaged 16,508 pounds of milk testing 3·03 per cent. As two-year-olds the daughters gave practically as much milk as their dams as mature cows, and the milk tested 0·28 per cent more. Prince Aaggie Mechthilde was the fourth bull used. The four heifers of this bull in their first lactation period gave an average of 14,175 pounds of milk testing 3·47 per cent, while their dams as mature cows gave 17,208 pounds of milk testing 3·04 per cent. The fifth bull used was Ottawa Korndyke Keyes. The yearly records of the cows sired by this bull, when mature, averaged 17,169 pounds of milk with an average test of 3·74 per cent. Their dams averaged 16,237 pounds of milk as mature cows with an average test of 3·15 per cent. The daughters of this bull therefore averaged 932 pounds of milk more than their dams, and the milk tested 0·59 per cent higher.

The results from the records made at this Station point out very clearly that breeding for milk production has been successful and that through the use of good bulls a great improvement has been made on the herd females.

MILK PRODUCTION OF PURE-BRED COWS

Following will be found a table giving the milk and fat production and feed consumption records for all cows and heifers which have finished a normal lactation period during the year 1930. The number of cattle which finished a normal lactation period during the year was less than in previous years due to the loss of several females through the abortion test. In addition to those reported there are six heifers that are now milking in their first period. The feed charges given in this table are for the feed during the actual period of milking, no allowance being made for the dry period previous to calving.

The profit column shows a comparison only between cost of feed and value of milk produced. The labour cost of caring for the cattle, the manufacture of butter, the interest on the investment, depreciation, etc., are not included nor is the value of calf at birth.

Butter is computed at 30 cents per pound and skim-milk at 20 cents per 100 pounds.

In estimating the cost of feeds the following values are used:—

Meal (oats, bran and oil cake)	$30 00 per ton
Corn and sunflower ensilage	4 00 per ton
Roots (Swede turnips and mangels)	5 00 per ton
Mixed hay	12 00 per ton
Pasture per month per cow	1 50

These values represent the cost of raising in the case of home-grown feeds and the actual cost price in the case of mill feeds, factory by-products, etc., that are purchased.

The average feed cost to produce one hundred pounds milk at this Station during the last four years was 97·2 cents in 1927; 99·6 cents in 1928; 92·5 cents in 1929, and 83 cents in 1930, averaging 93·07 cents for the four years.

The daily average yield of milk per cow in 1927 was 39·9 pounds; in 1928, 39·4 pounds; in 1929, 40·8 pounds, and in 1930, 40·9 pounds.

The average percentage of fat in the milk in 1927 was 3·48; in 1928, 3·64; in 1929, 3·62, and in 1930, 3·68 per cent.

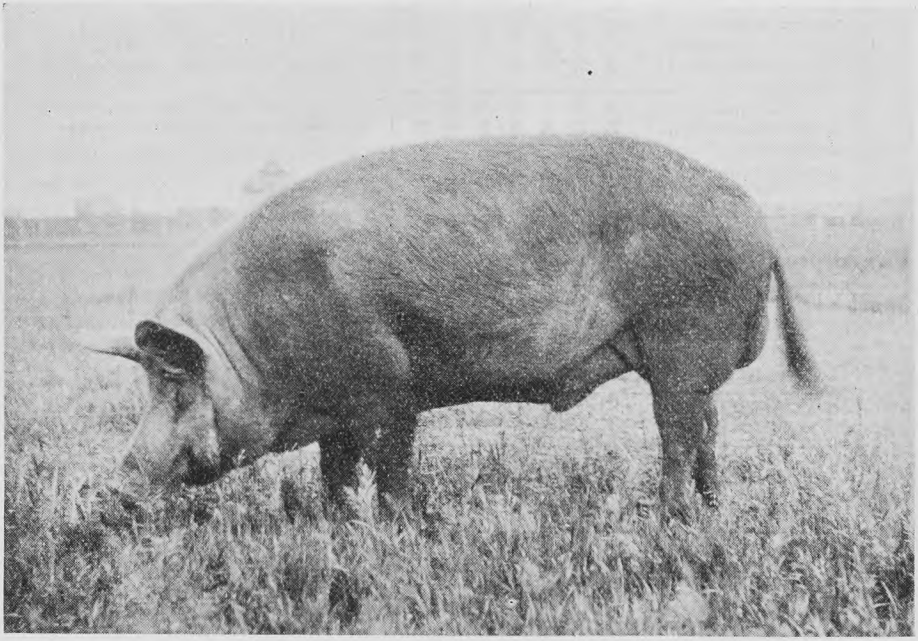
Individual Milk Records Completed During the Year 1930

Name of cow	Number of lactation period	Number of days in milk	Total pounds of milk for period	Daily average yield of milk	Average per cent fat in milk	Pounds fat for period	Pounds butter for period	Value of butter at 30 cents a pound	Value of skim-milk at 20 cents per cwt.	Total value of product	Amount of meal eaten	Amount of ensilage eaten	Amount of roots eaten	Amount of hay eaten	Months on pasture at $1.50 a month	Total cost of feed for period	Cost of feed to produce 100 pounds milk	Cost to produce 1 pound butter, skim-milk neglected	Profit on 1 pound butter, skim-milk neglected	Profit on cow for period, labour and calf neglected
		days	lb.	lb.	%	lb.	lb.	$	$	$	lb.	lb.	lb.	lb.	mos.	$	$	cts.	cts.	$
Lacombe May Gretchen	2	370	16,300	44·1	3·47	566	666	199 80	31 47	231 27	4,890	11,560	2,340	3,715	4	130 61	0 80	19·6	10·4	100 66
L.E.S. Rosa Gretchen	4	336	16,038	47·7	3·35	537	632	189 60	31 00	220 60	4,756	9,680	2,360	3,310	4·5	123 21	0 77	19·5	10·5	97·39
Midnight Princess L.E.S.	2	360	15,239	42·3	4·15	632	744	223 20	29 21	252 41	4,568	10,560	2,380	3,516	4·5	123 44	0 81	16·6	13·4	128 97
Lacombe Nina Gem DeKol	1	376	14,919	39·7	3·29	491	578	173 40	28 86	202 26	4,470	11,890	2,440	3,816	4	125 83	0 84	21·8	8·2	76 43
Lacombe Keyes DeKol Segis	1	333	10,071	30·2	4·15	418	492	147 60	19 31	166 91	3,212	9,990	2,390	3,430	4	100 72	1 00	20·5	9·5	66 19
Total for herd (5 cows)	.....	1,775	72,567	.....	.....	2,644	3,112	933 60	139 85	1,073 45	21,896	53,680	11,910	17,787	21·0	603 81	.....	.....	.....	469 64
Average for herd (5 cows)	.....	355	14,513·4	40·88	3·64	528·8	622·4	186 72	27 97	214 69	4,379·2	10,736	2,382	3,557·4	4·2	120 76	0 83	19·4	10·6	93 93

SWINE

The year 1930 has been marked by a renewed interest in the swine industry. The low prices for grain and comparatively high prices for hogs which prevailed during the year are causing farmers to turn from straight grain growing to the possibilities of hog feeding as one phase of diversified farming. The natural reaction to the extremely low grain prices has been experienced, in that there has been, during the fall of 1930, an unprecedented demand for breeding stock of both sexes and of every breed. The greatest demand has been for Yorkshires and was far in excess of the supply. Many more inquiries for Tamworths and Berkshires were received in the fall of 1930 than during the whole year 1929, and like the Yorkshires there was a greater call for breeding stock of these breeds than could be filled.

At the end of 1930 the breeding herd was made up of 35 Yorkshire sows and gilts and 4 Yorkshire boars; 17 Tamworth sows and gilts and 2 Tamworth boars and 14 Berkshire sows and gilts and 2 Berkshire boars, making a total of 66 head of sows and gilts and 8 boars. This is the largest number of breeding females that has been kept at this Station in any one year for some time. The breeding herd was increased to more adequately meet the demand for breeding stock next year, as well as the requirements for experimental feeding work which must always be kept in mind when accepting orders for breeding stock.



Maplehurst Rufus (20976) Tamworth herd sire at the Dominion Experimental Station, Lacombe, Alberta. This boar stood reserve champion to his own sire at the Canadian National Exhibition, 1927.

The sales of pork totalled 65,895 pounds, this figure slightly exceeding the sales during the last calendar year.

Of the 318 head marketed as pork during the year 1930, 60 per cent graded select bacon, 35 per cent graded bacon and 5 per cent butchers.

During the year there has been an important addition made to the herd of Yorkshires, a very promising two-year-old boar, Parkdale Farm Ruler —135606—, obtained from the Central Experimental Farm, Ottawa. He was

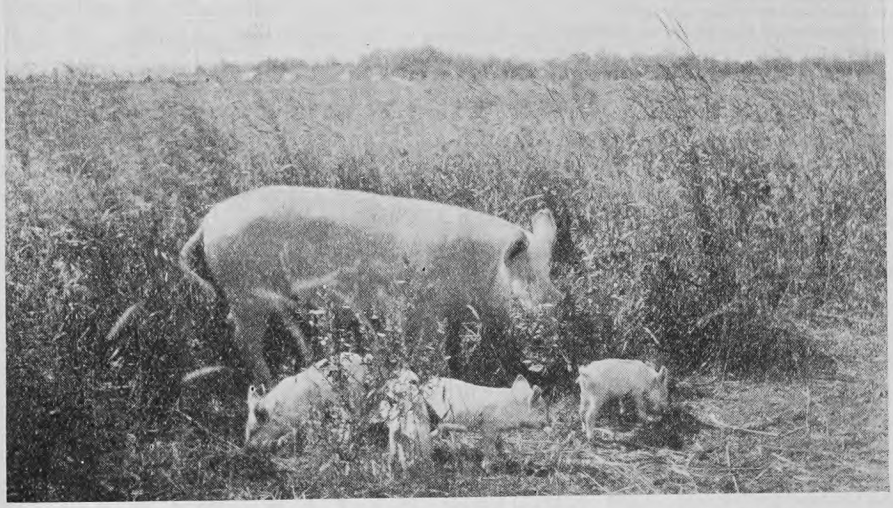
bred by A. Dynes, of Ottawa. His excellent length, depth, strength, smoothness and breediness generally mark him as one of the outstanding boars of the breed. He will be used on the progeny of the imported boar Dalmeny A.R. —88840—, and his son, Ottawa Alexander 138 —102759— latterly in use. He should prove a valuable acquisition for maintaining the substance, strength and type of the Yorkshire swine in the herd.

PASTURE CROPS FOR HOGS

Pasture crops should be provided if the most economical results are to be obtained in the feeding of growing pigs, brood sows and stock boars. In addition to providing nutrients the pasture causes the pigs to exercise which aids in the assimilation of the grains that they eat. Good pasture will carry young feeders and mature breeding stock over the summer period at a minimum cost and in a vigorous and thriving condition.

At this Station such pasture crops as oats, rye, rape, alfalfa, sweet clover, barley, wheat, peas, brome and various mixtures have been under test for a number of years.

For Central Alberta the rye-and-oat pasture is proving to be the most reliable year-in and year-out pasture. Two bushels of oats mixed with one bushel of fall rye per acre spring seeded has proven to be the most satisfactory. Fall rye and oats can be seeded as soon as the ground is ready and



Yorkshire sow with part of her litter in oat-winter-rye annual pasture.

will give a good healthy growth early enough for the spring pigs. The advantage of a mixture of oats and rye is that the oats make a very rapid growth which may be pastured off before the rye is ready. The rye coming on later will carry the hogs during the rest of the season. Rye without oats is practically as good, but takes longer to get a start.

Rape takes second place as an annual pasture for hogs. It makes a very satisfactory pasture for the late summer and fall. Rape may be seeded broadcast at the rate of 8 to 10 pounds per acre, or seeded in drills 30 inches apart and then cultivated between the rows to keep down the weed growth. A good stand of rape is capable of carrying from twenty-five to thirty pigs per acre.

3-892—3½

Alfalfa, where it can be grown, outranks all other feeds as a pasture for hogs. It has the greatest food value and the hogs prefer it. Unfortunately it is sometimes difficult to establish and also if too closely cropped is likely to be killed out. Sweet clover, on the other hand, is unpalatable, and not relished by hogs. If it gets beyond a foot high, they do not care for it and dig up the roots rather than eat the sweet clover.

The coarse grains, such as oats, barley and wheat, when sown alone or in combination, are commonly used for hog pastures. These crops mature quickly and if a continuous pasture is to be provided a succession of seedings must be made. One month of heavy pasturing will finish all the succulent green growth.

Another good pasture mixture for hogs is oats and peas but the peas are expensive and difficult to secure and if the season is dry give very poor returns.

Brome has been tried out as a hog pasture for the last three years only and results to date would indicate that it has a place as a permanent pasture for hogs. Further data, however, as to its palatability must be secured before definite statements can be made regarding its value as a hog pasture.

PROLIFICACY OF DIFFERENT BREEDS OF SWINE—SUMMARY OF YEARS 1925, 1926, 1927, 1928, 1929, 1930

—	Yorkshire	Berkshire	Tamworth
Total number of litters	164	59	87
Total number of pigs farrowed	1,840	553	750
Average number of pigs per litter	11·22	9·37	8·62
Total number of pigs raised to weaning	1,179	387	516
Average number of pigs weaned per sow	7·19	6·56	5·93

The above table is a summary of six years of breeding work comparing the prolificacy of the Yorkshire, Berkshire and Tamworth breeds of swine. In size of litters farrowed and in average number of pigs weaned per sow the Yorkshire ranks first, the Berkshire second and the Tamworth third. The Yorkshires are the most prolific and make the best mothers. As Tamworths have been raised at the Station only since 1925, only a six-year average is possible, but this includes large numbers of litters.

FARROWING STATEMENT OF 1930

—	Spring litters			Fall litters			Total spring and fall litters			Herd total
	Yorks.	Tams.	Berks.	Yorks.	Tams.	Berks.	Yorks.	Tams.	Berks.	
Number of litters farrowed in 1930	19	11	6	8	1	5	27	12	11	50
Total number of pigs farrowed	215	100	61	70	7	54	285	107	115	507
Number of pigs per litter (average)	11·32	9·09	10·2	8·75	7·0	10·8	10·56	8·92	10·45	10·14
Number of pigs dead at birth	32	12	3	2	.....	4	36	12	7	55
Number of pigs dead at birth per litter (average)	1·68	1·09	0·5	0·25	.....	0·8	1·33	1·0	0·64	1·1
Number of pigs dead before weaning per litter (average)	3·90	2·37	2·54	2·5	.....	4·0	3·49	2·17	3·18	3·1
Number of pigs weaned per litter (average)	7·42	6·72	7·66	6·25	7·0	6·8	7·07	6·75	7·27	7·04
Percentage of pigs farrowed alive raised	77·04	84·0	79·24	73·53	100·0	68·0	76·66	85·26	74·05	77·88

The above statement shows that 50 litters were raised during the year, of which 36 were spring and 14 were fall litters. The litters averaged 10·14 pigs per litter farrowed and 7·04 per litter raised.

Litters farrowed after July 1 are called fall litters, as they must be grown and finished mainly under fall and winter conditions.

During the last year 27 Yorkshires litters were farrowed, these giving a total of 285 pigs, an average per litter of 10·56 pigs. This was a decrease of approximately one per cent less than the average for the last five years. Of the total number of pigs farrowed alive, 77·88 per cent were raised to eight weeks or 1·66 per cent more than for the previous five years.

In the Tamworth herd a total of 12 litters were farrowed. The number of pigs farrowed per litter averaged 8·92 which is practically the same as for the last five years. Of the total number of pigs farrowed alive 85·26 per cent were raised to eight weeks or 6·91 per cent more than for the previous five years.

A total of eleven litters were farrowed in the Berkshire herd averaging 10·45 pigs per litter at birth and 7·27 at weaning or a percentage of 74·05 of the pigs which were farrowed alive, raised to weaning. This is a somewhat better record than that shown by the herd in the previous five years.

PROTEIN AND MINERAL SUPPLEMENTS FOR GROWING PIGS ON PASTURE

This experiment constitutes a repetition of similar experiments conducted during the summers of 1928 and 1929, with the exception that while the latter was conducted with dry lot fed pigs, this year's work was conducted with pigs having access to oat and rye pasture.

OBJECTS OF EXPERIMENT.—1. To compare the value of buttermilk and tankage for growing pigs on pasture.

2. To determine the value of a mineral mixture for growing pigs on pasture.

3. To note the effect of adding minerals to the ration of pigs receiving a tankage allowance while on pasture.

4. To determine the value of salt in the meal ration of pigs on pasture.

EXPERIMENTAL METHODS.—For this experiment, forty-eight pure-bred Yorkshire pigs were selected and weighed on June 17. These were divided equally into six lots of eight pigs each. As even a distribution as possible was made with respect to age, type, sex, average weight and general thrift. Previous to the beginning of the test the feeding and management of all pigs was practically the same. The average age of the pigs at the beginning of the experiment was 102 days. All lots were self-fed the same grain ration throughout the test. In addition lot 1 received buttermilk, lot 2 tankage, lot 3 tankage and minerals, lot 4 minerals, lot 5 salt and lot 6 received the meal ration without additions. Buttermilk was fed at the rate of 80 pounds per day, tankage at the rate of 8 per cent of the meal ration, and salt mixed with the grain at the rate of 2½ pounds in 100 pounds of grain. The mineral mixture consisting of slacked coal, 76 pounds; ground limestone, 3 pounds; salt, 20 pounds, and sulphur 1 pound, was available at all times to lots 3 and 4 from separate compartments of the self-feeders.

The pasture plots used were approximately one-eighth of an acre in extent and were sown a mixture of two bushels of oats and one bushel of fall rye per acre during the first week in May. During the dry weather the pasture crops grew very little and all forage was consumed by August. Following the early autumn rains further growth took place and all of the second growth was consumed. The pigs in all groups were watered twice daily, which meant that as a general rule water was before the pigs at all times. A-shaped portable cabins approximately 6 by 8 feet in size supplied shade and shelter, one of these cabins being available for each lot of eight pigs.

PROTEIN AND MINERAL SUPPLEMENTS—PROPORTIONS AND QUANTITIES FED

Lots	Number of hogs	Breed	Number of days fed	How fed	Meal ration fed	Other feeds
1	8	Yorkshires	92·2	Self-fed	First 30 days:—Oat chop, 1 part; barley chop, 1 part; shorts, 1 part.	Buttermilk, oat and rye pasture.
					Second 30 days:—Oat chop, 1 part; barley chop, 2 parts.	Buttermilk, oat and rye pasture.
					To end of test:—Oat chop, 1 part; barley chop, 3 parts.	Buttermilk, oat and rye pasture.
2	8	Same as above	86·7	Same as above	Same as above	8 per cent tankage, oat and rye pasture.
3	8	Same as above	85·5	Same as above	Same as above	8 per cent tankage plus a mineral mixture consisting of slacked coal, 76 lb. ground limestone, 3 pounds, salt, 20 pounds and sulphur, 1 pound, oat and rye pasture.
4	8	Same as above	88·7	Same as above	Same as above	Minerals and pasture as above.
5	8	Same as above	93·5	Same as above	Same as above	Salt mixed with the grain at the rate of 2½ pounds in 100 pounds of grain. Oat and rye pasture.
6	8	Same as above	97·7	Same as above	Same as above	No supplement. Oat and rye pasture.

PROTEIN AND MINERAL SUPPLEMENTS FOR GROWING PIGS ON PASTURE

Items		Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6
		Buttermilk	Tankage	Tankage and minerals	Minerals	Salt	Meal only
Number of hogs in experiment		8	8	8	8	8	8
Initial weight, gross	lb.	601	600	600	602	601	602
Initial weight, average	"	75·1	75·0	75·0	75·2	75·1	75·2
Finished weight, gross	"	1,743	1,612	1,669	1,562	1,679	1,545
Finished weight, average	"	217·9	201·5	208·6	195·3	209·9	193·1
Average number of days on feed	dys.	92·2	86·7	85·5	88·7	93·5	97·7
Total gain per lot during test	lb.	1,142	1,012	1,069	960	1,078	943
Average gain per animal for period	"	142·8	126·5	133·6	120·0	134·7	117·9
Average daily gain per animal	"	1·55	1·46	1·56	1·35	1·44	1·21
Amount of meal eaten by group (supplements not included)	"	4,833	4,839	4,863	5,150	5,501	5,310
Amount of buttermilk consumed by group	"	6,450	.....	.....	.....	.....	.....
Amount of tankage consumed by group	"	.....	387	389	.....	.....	.....
Amount of minerals consumed by group	"	.....	.....	330	1,310	.....	.....
Amount of salt consumed by group	"	.....	.....	.....	.....	138	.....
Cost of protein supplement per lot	$	12 90	10 06	10 11	.....	.....	.....
Cost of mineral mixture fed	$	.....	.....	1 19	4 72	.....	.....
Cost of salt fed	$	.....	.....	.....	.....	2 48	.....
Amount of meal eaten per pound gain	lb.	4·23	4·78	4·55	5·36	5·10	5·63
Amount of buttermilk eaten per pound gain	"	5·65	.....	.....	.....	.....	.....
Amount of tankage eaten per pound gain	"	.....	0·38	0·36	.....	.....	.....
Amount of minerals eaten per pound gain	"	.....	.....	0·31	1·36	.....	.....
Amount of salt eaten per pound gain	"	.....	.....	.....	.....	0·13	.....
Total cost of feed	$	80 14	77 42	79 26	75 91	78 51	73 26
Cost of feed per head	$	10 02	9 68	9 91	9 49	9 81	9 16
Cost of feed per head per day	cts.	10·87	11·16	11·59	10·70	10·43	9·37
Cost of feed to produce one pound gain	"	7·02	7·65	7·41	7·91	7·28	7·79
Profit per head over cost of feed when sold at 10 cents per pound, labour neglected	$	11 77	10 47	10 95	10 04	11 18	10 15

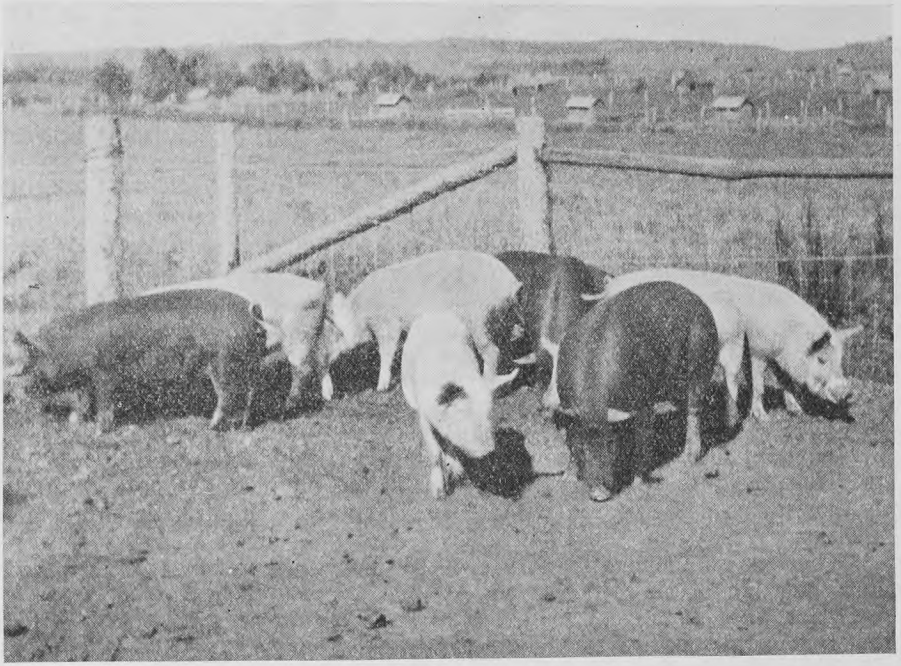
Prices charged for feeds:—

Ground oats	50 cents a bushel
Ground barley	60 cents a bushel
Shorts	$34.00 a ton
Tankage	$52.00 a ton
Buttermilk	2 cents a gallon
Minerals	36 cents per cwt.
Salt	$1.80 per cwt.

NOTE.—No charge was made for pasture.

RESULTS.—Bearing out previous tests the pigs which received buttermilk in addition to the meal ration, made the most economical gains and returned the highest net profit. The highest average daily gains, however, were made by the lot fed tankage and minerals in addition to the meal ration.

The lowest average daily gain and the highest meal consumption per pound of gain, is found in lot 6 fed the meal ration only.



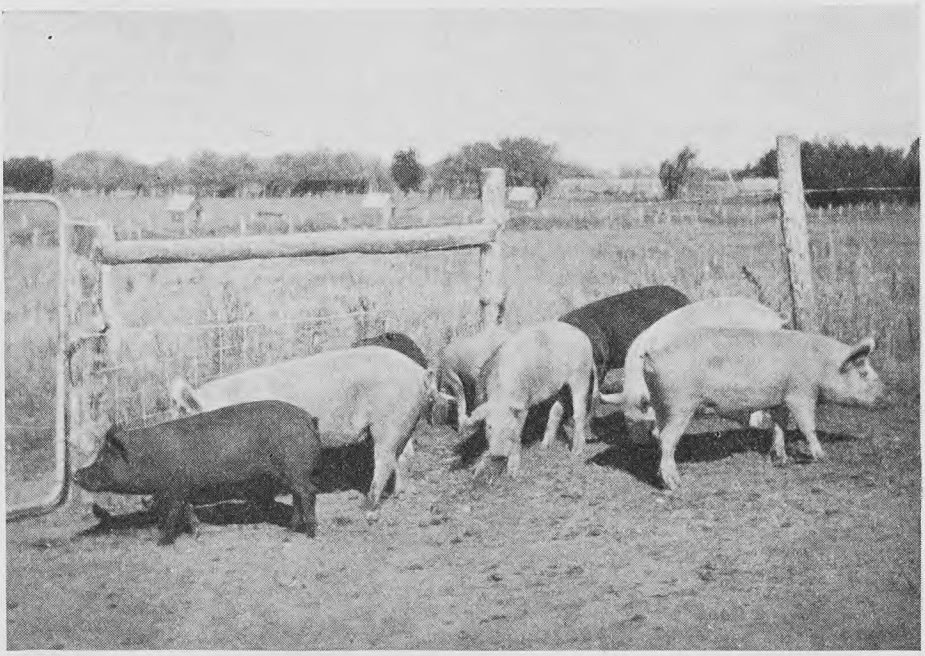
Protein and mineral supplements promote thrifty pigs and rapid gains. These pigs are Lot 1 in the 1928 experiment "Protein and Mineral Supplements for Growing Pigs." Note the uniformity and finish of these pigs as compared with Lot 6.

The feeding of buttermilk at the rate of 7 gallons per day resulted in a 28 per cent increase in daily gains and a 10 per cent decrease in cost of gains. The feeding of tankage at the rate of 8 pounds to 92 pounds of grain brought about a 20 per cent increase in daily gains and a 2 per cent decrease in cost of gains.

The use of a mineral mixture with pigs not receiving buttermilk, tankage or salt resulted in a 11 per cent increase in daily gains and 1½ per cent increase in cost of gains.

The feeding of salt at the rate of 2½ pounds in every 100 pounds of meal mixture resulted in a 19 per cent increase in daily gains and a 6 per cent decrease in cost of gains. In this experiment it proved more efficient than the mineral mixture which contained salt along with other ingredients.

Allowing pigs, receiving 8 pounds of tankage in every 92 pounds of grain, access to a mineral mixture brought about a 29 per cent increase in daily gains and a 5 per cent decrease in cost of gains.



Grain alone gives rise to slow and expensive gains. These pigs are Lot 6 in the 1928 experiment "Protein and Mineral Supplements for Growing Pigs." Note the unevenness of growth and unthrifty condition of the pigs as compared with Lot. 1.

A study of this experiment leads to the following conclusions:—

1. That all lots of pigs returned a fair profit over feed cost.
2. That the pigs receiving grain alone while on pasture made comparatively slow gains as compared with those receiving some form of supplement in addition.
3. That the supplementing of a grain ration with a mineral mixture gave greater gains but at an increased cost.
4. That when tankage was fed there appeared to be some advantage in adding a mineral mixture to the daily menu.
5. That the feeding of salt materially increased the daily gains and reduced the feed required for 100 pounds gain.
6. That the use of salt alone proved more efficient than the mineral mixture which contained salt along with other ingredients.

Comparing the four protein and mineral groups with lot 6 receiving grain alone, the following table is suggested:—

Items		Buttermilk	Tankage	Minerals	Salt
Increase in daily gain	lb.	0·34	0·25	0·14	0·23
Grain saved for 100 pounds gain	"	140	85	27	53
Grain saved by 1 pound of buttermilk, tankage, mineral or salt	"	0·25	2·24	0·20	4·08
Cost of 100 pounds of buttermilk, tankage, mineral or salt	$	0 20	2 60	0 36	1 80
Value of 100 pounds of buttermilk, tankage, mineral or salt based on value of grain replaced	$	0 34	2 97	0 27	5 72
Gain or loss in per cent on basis of grain saved. Gain expressed as + and loss expressed as −	%	+170	+114	−25	+318

It will be noted from the above table that on the basis of grain saved, buttermilk costing 2 cents a gallon had an actual value of 3·4 cents a gallon, tankage costing $2.60 per hundred pounds had an actual value of $2.97 per hundred pounds and salt costing $1.80 per hundred pounds had an actual value of $5.72 per hundred pounds. The mineral mixture costing 36 cents per hundred pounds had an actual value of 27 cents per hundred pounds or was fed at a loss of 9 cents per hundred pounds.

It is worthy of note, however, that the higher sale price which would ordinarily be obtained as a result of the earlier marketing of pigs, fed minerals on pasture in addition to the grain ration, would more than offset the slightly higher feed cost occasioned by feeding this supplement.

An endeavour is being made to repeat this work on a strictly comparable basis again in the season of 1931.

TANKAGE VS. FISH MEAL

During the summer of 1930 a test was made to compare the value of tankage and fish meal as protein supplements for growing swine. The tankage was 50 per cent protein and the fish meal was 65 per cent protein. Tankage and fish meal are useful mainly because of their protein and mineral content.

Plan of Experiment.—Twenty-two pigs were used in this experiment including pure-bred Yorkshires, Tamworths and Berkshires, and crosses from these three breeds. They were divided into two groups of eleven pigs each. In making the allotment the groups were arranged as nearly equal in weight, sex, age and general appearance as possible. The pigs were farrowed in March and April and the average age at the beginning of the experiment on July 9 was 89 days. Both lots were self-fed the same ration throughout the test. In addition lot 1 received tankage and lot 2 fish meal. Each supplement was fed at the rate of 8 per cent of the meal mixture. Each group of hogs had access to one-fourth of an acre of oat-and-rye pasture and a colony house for shade and shelter.

The hogs were weighed when placed on the test, each thirty days, and at the end of the test.

The feeds were accurately weighed and mixed in the proportions outlined in the plan.

TANKAGE VS. FISH MEAL—PROPORTION AND QUANTITIES FED

Lots	Number of hogs	Breed	Average number of days fed	How fed	Meal ration fed	Other feeds
1	11	Yorkshire, Tamworth and Berkshire and crosses from these three breeds.	109·5	Self-fed.....	First 30 days:— Oat chop, 1 part; barley chop, 1 part; shorts, 1 part. Second 30 days:— Oat chop, 1 part; barley chop, 2 parts. To end of test:— Oat chop, 1 part; barley chop, 3 parts.	8 per cent tankage, oat-and-rye pasture.
2	11	Same as above.	113·4	Same as above.	Same as above.....	8 per cent fish meal, oat-and-rye pasture.

The tankage was procured from the Swift Canadian Company Limited, Edmonton, Alberta, and the fish meal from the Wilbur-Ellis Company, Vancouver, B.C.

The following table shows the results of this test:—

TANKAGE VS. FISH MEAL

—		Lot 1 Tankage	Lot 2 Fish meal
Number of pigs in each lot		11	11
Initial gross weight of each lot	lb.	600	599
Initial average weight	"	54·5	54·5
Final gross weight of each lot	"	2,143	2,218
Final average weight	"	194·8	201·6
Average number of days on feed	days	109·5	113·4
Total gain per lot during test	lb.	1,543	1,619
Average gain per animal per period	"	140·3	147·2
Average daily gain per animal	"	1·28	1·30
Amount of meal eaten by group (supplements not included)	"	6,041	6,486
Amount of tankage consumed by group	"	755	.....
Amount of fish meal consumed by group	"	.....	811
Cost of protein supplement per lot	$	19 63	32 03
Amount of meal eaten per pound gain	lb.	3·92	4·01
Amount of supplement eaten per pound gain	"	0·49	0·50
Total cost of feed	$	103 23	122 04
Cost of feed per head	$	9 38	11 09
Cost of feed per head per day	cts.	8·57	9·78
Cost of feed to produce one pound gain	"	6·69	7·54
Profit per head over cost of feed when sold at 9 cents per pound, labour neglected	$	8 15	7 05

Prices charged for feeds:—

Ground oats	50 cents a bushel
Ground barley	60 cents a bushel
Shorts	$34 00 a ton
Tankage	$52 00 a ton
Fish meal	$79 00 a ton

NOTE.—No charge was made for pasture.

The total gain and the average daily gain are both in favour of the fish meal but the meal required per pound of gain is slightly in favour of the tankage-fed lot. The greater meal consumption coupled with the higher price of the fish meal accounts for the lower returns from this lot. The results, however, seem to indicate that fish meal would be satisfactory as a protein supplement if it could be purchased at the same price as tankage. Further experiments are being conducted with tankage and fish meal in 1931.

FALL PIG PRODUCTION

For good results fall litters should all be farrowed not later than September 15 so as to have the pigs well developed and able to stand cold weather by November. In order to have the pigs born from the first to the fifteenth of September, the sow must be bred between May 10 and 25. If she is to wean her spring litter before being bred she must farrow during the latter part of March or early in April. A sow which is to raise a fall as well as a spring litter must work harder than the sow raising but one litter during the year and should be particularly well fed after weaning to get her on the up-grade again before breeding her. In many cases, fall litters are small and weak simply due to breeding the sow too soon, or when in too thin condition.

The ability to raise fall pigs is the final test of the successful hog feeder. Too late farrowing in the fall, over-crowding and over-feeding, damp quarters, lack of exercise and the feeding of unbalanced rations are the usual causes of failure with fall litters. If substitutes cannot be provided, when skim-milk

or buttermilk is scarce the results in fall pig raising may prove disappointing. When milk is scarce, tankage fed at the rate of 7 per cent of the grain ration will keep fall pigs making satisfactory and economical gains.

The following table shows the performance of fall pigs fed on a ration of home-grown grains and shorts supplemented with either tankage or buttermilk throughout an eight-year period:—

RESULTS OF EIGHT YEARS' WORK WITH FALL PIGS

—		1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30
Average daily gain	lb.	0·85	0·98	0·97	0·98	0·83	1·01	1·25	1·07
Feed for 100 pounds gain	"	527·4	494·1	565·3	680·4	564·0	533·8	426·7	490·5
Cost of 100 pounds gain	$	5 77	4 40	7 91	7 54	7 90	7 71	5 85	7 59
Feed Prices—									
Oats per bushel	cts.	50	28	48	34	42	55	48	50
Barley per bushel	"	60	42	75	48	58	65	58	60
Frozen wheat per bushel	"	.....	60	.....	.....	.....	.....	60	.....
Shorts per ton	$	20 00	22 00	30 00	27 00	27 00	29 00	.....	34 00
Tankage per ton	$	50 00	50 00	50 00	48 00	50 00	50 00	50 00	52 00
Buttermilk per cwt	cts.	.....	20	.....	.....	20	20	.....	20
Selling price per 100 pounds	$	8 70	6 50	10 25	11 75	11 00	9 50	11 00	11 00
Minimum temperature		−45	−41·4	−57	−15	−39·0	−46	−53	−32

Eight-Year Average Results

Daily gain	0·99 pounds
Feed for 100 pounds gain	535·28 "
Cost per 100 pounds gain	$ 6 83
Selling price	9 96

COMPARISON OF SPRING AND FALL FARROWING RECORDS FOR THE EIGHT YEARS 1923-30 INCLUSIVE

—		Spring farrowing 1923-30	Fall farrowing 1923-30
Number of sows farrowed	No.	283	146
Total pigs farrowed	"	2,962	1,434
Average size of litters	"	10·5	9·8
Total pigs raised to 8 weeks	"	1,861	1,033
Percentage pigs raised to 8 weeks	%	62·8	72·0
Percentage pigs born dead	%	11·3	8·2

The above table shows that 283 sows of all ages and breeds farrowing in the spring during the eight years gave birth to 2,962 pigs or an average of 10·5 pigs, while the 146 sows farrowing in the fall produced 1,434 pigs or an average of 9·8 pigs to the litter. The difference in size of litters is slightly in favour of the spring farrowed sows but when the percentage of pigs raised to weaning time is considered the fall farrowed pigs made the best showing. Of the 2,962 spring farrowed pigs only 1,861 or 62·8 per cent were raised to weaning time at eight weeks of age. Of the 1,434 fall farrowed pigs 1,033 or 72·0 per cent were raised to weaning age. The sows farrowing in the fall brought 9·2 per cent more pigs through to weaning time than did those farrowing in the spring. It is interesting to note, too, that where 11·3 per cent of the spring farrowed pigs were dead at birth, only 8·2 per cent of the fall farrowed pigs were born dead.

Litters farrowed after July 1 are called fall litters, as they must be grown and finished mainly under fall and winter conditions.

PROTEIN SUPPLEMENTS FOR REARING FALL PIGS

OBJECT OF EXPERIMENT.—To determine the relative value of buttermilk, digester tankage, fish meal, alfalfa meal, oil-cake meal and a mixed supplement (50 per cent tankage, 15 per cent fish-meal, 20 per cent oilcake meal and 15 per cent alfalfa meal) as supplements to a grain ration in feeding growing pigs during the winter months and in finishing pigs for the market.

PLAN OF EXPERIMENT.—Fifty-six pigs were used in this experiment including pure-bred Yorkshires, Tamworths, Berkshires and Tamworth-Berkshire cross-breds. They were divided into seven lots containing eight pigs each. In making up the seven lots due consideration was given to having uniformity in breeding, condition, age and weight. All lots were fed the same grain ration throughout the test. In addition lot 1 received buttermilk, lot 2 tankage, lot 3 fish meal, lot 4 alfalfa meal, lot 5 oil-cake meal, lot 6 mixed supplement (50 per cent tankage, 15 per cent fish meal, 20 per cent oil-cake meal and 15 per cent alfalfa meal), and lot 7, which was the check lot, received only the meal ration. Buttermilk was fed at the rate of 75 pounds per day and tankage, fish meal, alfalfa meal, oil-cake meal and the mixed supplement at the rate of 7 per cent of the meal ration. All groups were self-fed with feeders placed close to the 6 by 8 feet colony houses in which the pigs were sheltered. Water from which the chill had been removed was provided twice daily to all lots except lot 1, which received buttermilk to drink instead of water.

PROTEIN SUPPLEMENTS FOR REARING FALL PIGS—PROPORTIONS AND QUANTITIES FED

Lots	Number of hogs	Breed	Average number days fed	How fed	Meal ration fed	Other feeds
1	8	Yorkshires, Berkshires, Tamworths and Tamworth-Berkshire cross-breeds.	123·5	Self-fed.....	First 30 days:—Oat chop, 1 part; barley chop, 1 part; shorts, 1 part.	Buttermilk, 75 pounds a day.
					Second 30 days:—Oat chop, 1 part; barley chop, 2 parts.	Buttermilk, 75 pounds a day.
					To end of test:—Oat chop, 1 part; barley chop, 3 parts.	Buttermilk, 75 pounds a day.
2	8	Same as above.....	117·6	Same as above	Same as above.....	7 per cent tankage.
3	8	Same as above.....	129·0	Same as above	Same as above.....	7 per cent fish meal.
4	8	Same as above.....	134·0	Same as above	Same as above.....	7 per cent alfalfa meal.
5	8	Same as above.....	129·0	Same as above	Same as above.....	7 per cent oilcake meal.
6	8	Same as above.....	126·4	Same as above	Same as above.....	Mixed supplement (50 per cent tankage, 15 per cent fish meal, 20 per cent oilcake meal and 15 per cent alfalfa meal.)
7	8	Same as above.....	134·2	Same as above	Same as above.....	No supplement.

The tankage was procured from the Swift Canadian Company Limited, Edmonton, Alberta, and the oil-cake meal from the Dominion Linseed Oil Company, St. Boniface, Manitoba. The fish meal is a product of the Wilbur-Ellis Company, Vancouver, B.C. The alfalfa meal was made by putting through a Letz grinder good quality baled alfalfa hay grown in Southern Alberta.

Prices charged for feeds:—

Ground oats	50 cents a bushel
Ground barley	60 cents a bushel
Shorts	$34 00 a ton
Buttermilk	2 cents a gallon
Tankage	$52 00 a ton
Fish meal	$79 00 a ton
Alfalfa meal	$35 00 a ton
Oil-cake meal	$52 00 a ton
Mixed supplement (50 per cent tankage, 15 per cent fish meal, 20 per cent oil-cake meal and 15 per cent alfalfa meal)	$53 50 a ton

Representative samples of the feeds used were taken and submitted to the Dominion Chemist, for analysis with the following results:—

RESULTS OF ANALYSES

——	Moisture	Protein	Fat	Carbohydrates	Fibre	Ash
	%	%	%	%	%	%
Lab'y. No. 102305—Digester tankage..	5·45	51·14	12·38	.....	.....	25·05*
Lab'y. No. 102306—Oil-cake meal.....	7·38	40·18	6·45	33·80	7·24	4·95
Lab'y. No. 102307—Fish meal.....	6·80	64·44	5·73	.....	.....	14·69**
Lab'y. No. 102308—Alfalfa meal, grown in Central Alberta.....	5·43	14·00	1·98	39·97	30·24	8·38

*Bone phosphate—22·15 per cent. **Bone phosphate—14·62 per cent.

In connection with this analysis, Dr. F. T. Shutt, the Dominion Chemist, makes the following observations:—

DIGESTER TANKAGE.—It fully meets its guarantee in respect to protein and fat. Its percentage of bone phosphate is 22·15. In the form of a dark brown, fairly fine, free-flowing powder with the characteristic odour of tankage. Apparently sound and wholesome.

OIL-CAKE MEAL.—It fully and satisfactorily meets its guarantee. This appears to be a sample exceptionally high in protein; the range for "new process" oil-cake meal would be from our records, from, say, 33 to 36 per cent.

FISH MEAL.—This satisfactorily meets its guarantee in respect to protein, fat and bone phosphate. Dark yellow or light brown fine powder. Sound. A high grade fish meal.

ALFALFA MEAL.—Bright green, coarsely ground; made from good quality baled alfalfa hay.

The data for protein and fibre indicate that this meal is from a fairly mature crop. It may be considered of medium quality only.

The results of the test are given in the following table:—

PROTEIN SUPPLEMENTS FOR REARING FALL PIGS

Items		Lot 1 Buttermilk	Lot 2 Tankage	Lot 3 Fish meal	Lot 4 Alfalfa meal	Lot 5 Oil-cake meal	Lot 6 Mixed supplement	Lot 7 Meal only
Number of pigs in experiment		8	8	8	8	8	8	8
Initial weight, gross	lb.	498	498	497	498	500	494	494
Initial weight, average	"	62·3	62·3	62·1	62·3	62·5	61·8	61·8
Finished weight, gross	"	1,629	1,704	1,541	1,574	1,304	1,740	1,262
Finished weight, average	"	203·6	213·0	192·6	196·8	163·0	217·5	157·8
Average number of days on feed	days	123·5	117·6	129·0	134·0	129·0	126·4	134·2
Total gain per lot during test	lb.	1,131	1,206	1,044	1,076	804	1,246	768
Average gain per animal for period	"	141·4	150·8	130·5	134·5	100·5	155·8	96·0
Average daily gain per animal	"	1·14	1·28	1·01	1·00	0·78	1·23	0·72
Amount of meal eaten by group (supplements not included)	"	4,280	5,694	5,758	5,529	4,485	5,844	5,005
Amount of buttermilk consumed by group	"	9,225	.....	.....	.....	.....	.....	.....
Amount of tankage consumed by group	"	.....	399	.....	.....	.....	.....	.....
Amount of fish meal consumed by group	"	.....	.....	403	.....	.....	.....	.....
Amount of alfalfa meal consumed by group	"	.....	.....	.....	387	.....	.....	.....
Amount of oil-cake consumed by group	"	.....	.....	.....	.....	314	.....	.....
Amount of mixed supplement consumed by group	"	.....	.....	.....	.....	.....	409	.....
Cost of protein supplement per lot	$	18 45	10 37	15 92	6 77	8 16	10 93	.....
Amount of meal eaten per pound gain	lb.	3·78	4·72	5·52	5·14	5·58	4·69	6·52
Amount of supplement eaten per pound gain	"	8·16	0·33	0·39	0·36	0·39	0·33	.....
Total cost of feed	$	75 38	85 89	92 16	80 08	67 69	88 37	66 38
Cost of feed per head	$	9 42	10 74	11 52	10 01	8 46	11 05	8 30
Cost of feed per head per day	cts.	7·63	9·13	8·93	7·47	6·56	8·74	6·18
Cost of feed to produce one pound gain	"	6·66	7·12	8·83	7·44	8·42	7·09	8·64
Profit per head over cost of feed when sold at 11 cents per pound, labour neglected	$	12 98	12 69	9 67	11 64	9 47	12 88	9 06

SUMMARY.—Lot 2 which received tankage in addition to the meal ration made the highest daily gains but lot 1 which received buttermilk as a supplement to the meal ration made the most economical gains and returned the highest net profit. The largest gains, however, were made by the lot fed the mixed supplement in addition to the meal ration.

The lowest average daily gain and the highest meal consumption per pound of gain is found in lot 7 fed the meal ration only.

DEDUCTIONS.—1. From the preceding table and also from information derived from similar work along this line, it would appear that farm grown grains will prove adequate for fall pigs but these must be supplemented with milk or suitable milk substitutes if good results are to be obtained.

2. Buttermilk is one of the most economical feeds with which to supplement the meal ration. In this particular test feeding of buttermilk reduced the cost of putting on 100 pounds live weight gain from $8.64 to $6.66 and increased the gains by 58 per cent.

3. The use of tankage increased the gains by 78 per cent and reduced the cost of putting on 100 pounds live weight gain from $8.64 to $7.12.

4. The addition of 7 per cent of fish meal to the ration increased the gains but such gains were not sufficiently large to compensate for the increased cost of the ration at the price charged for this supplement. The feeding of this supplement brought about a 40 per cent increase in daily gains but increased the cost of gains by 2 per cent.

5. The use of alfalfa meal and oil-cake meal resulted in increased gains and more economical gains but they did not show up well when compared with a mixed supplement, buttermilk and tankage as a protein supplement. Their use can no doubt be recommended in a mixture of protein supplements rather than as single supplements.

6. The feeding of alfalfa meal at the rate of seven pounds to 93 pounds of grain resulted in a 39 per cent increase in daily gains and a 14 per cent decrease in cost of gains.

7. The feeding of oil-cake meal at the rate of 7 pounds to 93 pounds of grain resulted in a four-fifths per cent increase in daily gains and a 2·6 per cent decrease in cost of gains.

8. In some respects the group fed the mixed supplement at the rate of 7 pounds to 93 pounds of grain made the best showing of any of the lots on test. The use of this supplement increased the daily gains by 71 per cent as compared with the feeding of grain alone and reduced the cost of gains by 18 per cent.

Comparing the six protein supplement groups with lot 7 receiving grain alone, the following table is suggested:—

Results with Different Supplements

Items		Buttermilk	Tankage	Fish meal	Alfalfa meal	Oil-cake meal	Mixed supplement
Increase in daily gain	lb.	0·42	0·56	0·29	0·28	0·06	0 51
Grain saved for 100 pounds gain	"	274	180	100	138	94	183
Grain saved by 1 pound buttermilk, tankage, fish meal, alfalfa meal, oil-cake meal or mixed supplement	"	0·34	5·45	2·56	3·83	2·41	5·54
Cost of 100 pounds of buttermilk, tankage, fish meal, alfalfa meal, oil-cake meal or mixed supplement	$	0 20	2 60	3 95	1 75	2 60	2 67
Value of 100 pounds of buttermilk, tankage, fish meal, alfalfa meal, oil-cake meal or mixed supplement based on value of grain replaced	$	0 44	7 21	3 46	5 08	3 16	7 37
Gain or loss in per cent on basis of grain saved. Gain expressed as + and loss expressed as −.	%	+220	+277	−12	+290	+122	+276

By briefly reviewing the above table the reader will observe that while buttermilk costs 2 cents per gallon it had an actual value of 4·4 cents per gallon on the basis of grain saved; tankage costing $2.60 per hundred pounds had an actual value of $7.21 per hundred pounds and alfalfa meal costing $1.75 per hundred pounds had an actul value of $5.08 per hundred pounds. On the

basis of grain saved oil-cake meal costing $2.60 per hundred pounds had an actual value of $3.16 per hundred pounds, the mixed supplement costing $2.67 per hundred pounds had an actual value of $7.37 per hundred pounds and fish meal costing $3.95 per hundred pounds had an actual value of $3.46 or was fed at a loss of 49 cents per hundred pounds.

ADVANCED REGISTRY POLICY FOR SWINE

The purpose of the Advanced Registry Policy for pure-bred swine, which is being promoted by the Dominion Department of Agriculture and handled by the Dominion Live Stock Branch is to measure accurately and record authentically the productiveness, the feeding qualities, the early or late maturing tendencies and the slaughter merits of our foundation breeding stock. It is practically the same as that adopted and put in force in the Advanced Registry of bulls of certain breeds of cattle, and also the classification of rams in registered flocks of sheep. This policy gives official recognition to breeding stock in Canada, the progeny of which other breeders may purchase with confidence for the improvement of their herds. It will weed out the strains which are slow in maturing and costly feeders and we must do that in order to make swine production profitable. It is expected that as the policy becomes generally applied that Canada will gradually build up a number of valuable family strains which will have much to do in lowering pork production costs.

The Advanced Registry Policy for pure-bred swine is now on a concrete and workable basis and is open to all breeders of pure-bred bacon hogs, who are interested in the improvement of their breeding stock. Further insight into this policy may be obtained by writing A. W. Peterson, Supervisor of Advanced Registry, Dominion Live Stock Branch, Ottawa.

Testing Swine under the Advanced Registry Policy Procedure.—Continuing the work started in 1928 and 1929 when eleven and fifteen litters respectively were under test, fifteen litters comprising seven pure-bred Yorkshires, six pure-bred Tamworths and two pure-bred Berkshires, ranging in numbers from six to ten pigs per litter were entered in this scheme in the spring of 1930. The complete litters, with the exception of a few pigs kept from some of the litters for breeding purposes, were included in the experimental project although the scheme called for five pigs from each litter only, four of which were to be used for slaughter. One pig was carried more or less as a spare in case of some accident to one of the pigs if only four were kept. The five pigs nominated from each litter were entered at the time of the Inspector's visit, and were fed with the other pigs in the litter, up to market weights of 190 to 230 pounds. The Inspector weighed the individual pigs in each litter, when they were from five to eight weeks of age, before weaning and at the same time tattooed all hogs according to the plan set out in the policy. When each of the four pigs nominated from each litter reached their proper development they were shipped by express to Swift's abattoir, at Edmonton, for the slaughter test.

Each litter had access during the greater part of the feeding period to one-third of an acre of an annual pasture seeded with two bushels of oats and one bushel of rye per acre. This pasture was seeded on land broken from brome grass sod in the fall of 1929 and had considerable volunteer brome growing in the pasture crop. Six by eight-foot portable cabins were provided for shade and shelter. When the pigs reached approximately one hundred and fifty pounds in weight they were moved into the main piggery and confined for finishing. All grain was ground and fed dry in a trough twice daily. A small quantity of buttermilk was supplied to each litter daily in a separate trough as well as all the water they wished to drink.

Weights

The individual hogs in each litter were weighed when the pigs were weaned and put on test, at the end of each 30-day period and at the termination of the experiment. A record was kept of the amount of feed consumed by each group of pigs during the feeding period from weaning to slaughter. Changes in rations were made at the end of sixty- and thirty-day periods, and the amount of feed consumed during each period was recorded. Samples were taken of all feeds used each period and forwarded to Dr. F. T. Shutt, Dominion Chemist, Ottawa, for analysis.

The following rations were used during the feeding period:—

First 60 days—

	lb.
Oat chop	200
Barley chop	100
Shorts	100
Tankage	12
Salt	2
Buttermilk	hand fed
Cost of meal mixture per hundred pounds	$1 51
Cost of buttermilk per hundred pounds	$0 20

60 to 90 days—

	lb.
Oat chop	100
Barley chop	200
Shorts	100
Tankage	12
Salt	2
Buttermilk	hand fed
Cost of meal mixture per hundred pounds	$1 45
Cost of buttermilk per hundred pounds	$0 20

90 days to finish—

	lb.
Oat chop	100
Barley chop	300
Tankage	12
Salt	2
Buttermilk	hand fed
Cost of meal mixture per hundred pounds	$1 34
Cost of buttermilk per hundred pounds	$0 20

The following table is a statement of the cost of production of each of the fifteen litters included in the Advanced Registration scheme for swine in 1930, together with the amount of feed consumed, cost of feed per pound of pork produced and profit over feed.

The profit column shows a comparison only between cost of feed and value of pork produced. The cost of the labour and interest on the investment are not included. No charge was made for pasture.

The results obtained from this test are in accord with those obtained from a similar test conducted in 1929 in that there was a wide variation in the amount of feed and the time required to produce 100 pounds of pork. The best litter required 337 pounds of grain and the poorest 471 pounds. In 1929 the best litter required 326 pounds of grain and the poorest 425 pounds. The average daily gain per hog from weaning to slaughter varied from 1·22 to 1·46 pounds in 1930 and from 1·05 to 1·38 pounds in 1929.

Lot No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average
Sow No.	12	8	5	3	25	21	19	6	3	4	10	31	16	20	11	15
Breed	York-shire	York-shire	York-shire	York-shire	York-shire	York-shire	York-shire	Tam-worth	Tam-worth	Tam-worth	Tam-worth	Tam-worth	Tam-worth	Berk-shire	Berk-shire	litters
Number of pigs	5	6	8	10	7	8	7	7	6	9	5	7	8	9	7	7·3
Date farrowed	1930 Jan. 25	1930 April 1	1930 Feb. 28	1930 Jan. 21	1930 Jan. 20	1930 Jan. 8	1930 Jan 25	1930 Mar. 15	1930 April 9	1930 Mar. 27	1930 Mar. 3	1930 May 7	1930 April 1	1930 April 10	1930 April 5	
Date weaned and placed on test	1930 Mar. 25	1930 May 31	1930 April 29	1930 Mar. 18	1930 Mar. 18	1930 Mar. 13	1930 Mar. 25	1930 May 14	1930 June 7	1930 May 27	1930 May 2	1930 July 5	1930 May 31	1930 June 9	1930 June 4	
Number of days from birth to weaning	59	60	60	56	57	64	59	60	59	61	60	59	61	60	60	59·7
Date off test	1930 July 21	1930 Oct. 6	1930 Sept. 8	1930 Aug. 11	1930 Aug. 1	1930 Aug. 1	1930 Aug. 18	1930 Sept. 22	1930 Oct. 13	1930 Oct. 6	1930 Sept. 15	1930 Nov. 17	1930 Oct. 13	1930 Oct. 20	1930 Oct. 13	
Average number of days on feed	115·2	118·2	129·2	139·8	132·3	132·0	138·6	122·3	123·3	123·9	129·4	132·4	127·2	130·8	128·0	128·7
Average number of days from birth to slaughter	174·2	178·2	189·2	195·8	189·3	196·0	197·6	182·3	182·3	184·9	189·4	191·4	188·2	190·8	188·0	187·8
Total initial weight at weaning lb.	174	228	253	328	212	294	200	254	213	270	148	186	241	250	204	230·3
Average initial weight at weaning "	34·8	38·0	31·6	32·8	30·3	36·7	28·6	36·3	35·5	30·0	29·6	26·6	30·1	27·8	29·1	31·7
Total finished weight at Farm "	1,014	1,266	1,607	2,144	1,430	1,638	1,438	1,367	1,164	1,734	1,007	1,357	1,565	1,691	1,378	1,453·3
Average finished weight at Farm "	202·8	211·0	200·9	214·4	204·3	204·7	205·4	195·3	194·0	192·7	201·4	193·9	195·6	187·9	196·9	200·0
Total gain "	840	1,038	1,354	1,816	1,218	1,344	1,238	1,113	951	1,464	859	1,171	1,324	1,441	1,174	1,223·1
Average gain per hog from weaning "	168·0	173·0	169·2	181·6	174·0	168·0	176·9	159·0	158·5	162·7	171·8	167·3	165·5	160·1	167·7	168·3
Average daily gain per hog from weaning "	1·46	1·46	1·31	1·30	1·32	1·27	1·28	1·30	1·30	1·31	1·33	1·26	1·30	1·22	1·31	1·31
Total meal consumed "	2,828	3,880	4,982	7,231	4,513	5,200	4,941	4,752	4,476	5,822	3,576	4,762	5,728	5,167	4,081	4,795·9
Total buttermilk consumed "	4,480	5,025	5,750	7,850	4,734	5,625	5,425	5,350	4,825	7,550	4,550	5,440	5,960	5,875	5,545	5,598·9
Pounds meal eaten per pound of gain "	3·37	3·74	3·68	3·98	3·71	3·87	3·99	4·27	4·71	3·98	4·16	4·07	4·33	3·59	3·48	3·92
Pounds buttermilk eaten per pound of gain "	5·33	4·84	4·25	4·32	3·89	4·19	4·38	4·81	5·07	5·16	5·30	4·65	4·50	4·08	4·72	4·58
Total cost of feed including buttermilk $	49 88	65 82	82 26	117 40	73 93	85 12	81 10	78 39	73 84	98 07	59 66	78 29	93 54	85 33	69 12	79 45
Cost of feed per head $	9 98	10 97	10 28	11 74	10 56	10 64	11 59	11 20	12 31	10 90	11 93	11 18	11 69	9 48	9 87	10 88
Cost of feed per pound gain cts.	5·94	6·34	6·08	6·46	6·07	6·33	6·55	7·04	7·76	6·70	6·95	6·69	7·06	5·92	5·89	6·50
Returns per head at 10 cents per pound less cost of all feed $	10 30	10 13	9 80	9 70	9 87	9 83	8 95	8 33	7 09	8 37	8 21	8 20	7 87	9 31	9 82	9 12

The average growth and feeding data of thirty litters entered in Advanced Registry during the years 1929 and 1930 suggest the following table:—

Number of pigs		238
Average initial weight at weaning	lb.	28·3
Average finished weight at Farm	"	202·2
Average daily gain	"	1·25
Feed required for 100 pounds gain—		
Grain	"	382·5
Buttermilk	"	447·0
Cost of 100 pounds gain	$	6 20
Average returns per head at 10 cents per pound less cost of all feed	$	9 42

SWINE ENTERED UNDER ADVANCED REGISTRY POLICY FOR SWINE

Breed	Sow No.	Registration number of sow	Registration number of sire of litter	Litter data										
				Number born	Number weaned	Weight of litter		Feed consumption of sow and litter; farrowing to weaning	Cost of feed consumed by sow while nursing litter	Cost to raise one pig from birth to weaning	Number of pigs fed from weaning	Cost of feed consumed by litter weaning to slaughter	Cost of feed per head weaning to slaughter	Total cost to raise one pig; birth to slaughter
						Birth	Weaning							
						lb.	lb.	lb.	$	$		$	$	$
Yorkshire	3	130011	102759	10	10	36·6	328	690	10 49	1 05	10	117 40	11 74	12 79
Yorkshire	5	135579	102759	17	9	46·2	274	736	11 19	1 24	8	82 26	10 28	11 52
Yorkshire	8	135692	88840	8	6	28·0	228	690	10 49	1 75	6	65 82	10 97	12 72
Yorkshire	12	130946	88840	17	6	51·0	210	592	9 00	1 50	5	49 88	9 98	11 48
Yorkshire	19	130858	102759	11	8	28·6	220	612	9 30	1 16	7	81 10	11 59	12 75
Yorkshire	21	122474	102759	17	8	56·1	294	724	11 00	1 37	8	85 12	10 64	12 01
Yorkshire	25	122473	88840	21	10	63·0	281	672	10 21	1 02	7	73 93	10 56	11 58
Tamworth	3	21918	20159	7	6	26·8	213	736	11 19	1 86	6	73 84	12 31	14 17
Tamworth	4	21922	20976	13	9	36·0	270	776	11 80	1 31	9	98 07	10 90	12 21
Tamworth	6	21989	20159	8	7	25·6	254	740	11 25	1 61	7	78 39	11 20	12 81
Tamworth	10	21436	20159	6	6	19·8	175	664	10 09	1 68	5	59 66	11 93	13 61
Tamworth	16	20705	20976	11	8	29·3	241	772	11 73	1 47	8	93 54	11 69	13 16
Tamworth	31	20453	20159	15	7	39·3	186	750	11 40	1 63	7	78 29	11 18	12 81
Berkshire	11	72537	72318	11	10	33·0	291	770	11 70	1 17	7	69 12	9 87	11 04
Berkshire	20	71372	72318	12	10	43·9	300	748	11 37	1 14	9	85 33	9 48	10 62
Total for herd (15 sows)				184	120	563·2	3,765	10,672	162 21	20 96	109	1,191 75	164 32	185 28
Average for herd (15 sows)				12·3	8	37·5	251·0	711·5	10 81	1 35	7·3	79 45	10 95	12 35
Average weight per pig						3·06	31·4							

A study of the above table reveals the fact that the cost to raise one pig to weaning (59·7 days) in the fifteen litters, varied from $1.02 to $1.86, the number of pigs in the litter from birth to weaning time causing most of this variation. It will be seen, therefore, that a prolific and good motherly sow is one of the great factors in economical pork production, as the cost per pig is determined to a great extent by the number of pigs weaned. The cost to raise one pig from birth to slaughter (187·8 days) in the fifteen litters varied from $10.62 to $14.17, thus indicating that there are certain strains of swine which will produce hogs of market weights much more economically than will other strains.

Under tentative standards the minimum score required for a sow to qualify is as follows: Production, 40; maturity index, 100; slaughter test, 75.

The score for production is obtained by allotting five points for each pig which the sow brings to weaning age so that a sow to qualify for production cannot do so with less than eight pigs weaned, thereby scoring forty points.

The minimum score for the early maturing factor is 100, which means that the sow has produced with the four pigs nominated at weaning time, an average gain of 200 pounds in 200 days or the equivalent of this rate of gain. A sow having progeny making better gains than these would score more than 100 while a sow producing slow maturing pigs would score less than 100 and would fail to pass the standard for early maturity.

The slaughter test takes into consideration the age of pigs, weight of carcass, length of side, shoulder fat, loin fat, minimum back fat, percentage of middle, the belly thickness, finish, balance of side and evenness.

The dam is, therefore, rated according to her prolificacy, ability to feed her pigs, their thriftiness and how they score on the rail.

The slaughter records are not yet available for 1930 but the following table gives the rating of the fifteen sows entered under the Advanced Registry policy in 1929:—

Rating of Sows

Breed	Sow	Production	Maturity index	Slaughter test
Yorkshire	T A	55	94	79
Yorkshire	T B	30	98	75
Yorkshire	T C	45	100	90
Yorkshire	T Q	50	94	74
Yorkshire	T D	50	101	81
Yorkshire	T E	40	104	90
Yorkshire	T H	60	104	90
Yorkshire	T I	45	103	86
Yorkshire	T K	35	99	87
Tamworth	T L	30	100	86
Tamworth	T M	40	98	92
Tamworth	T N	35	99	94
Tamworth	T O	50	103	66
Berkshire	T T	50	97	71
Berkshire	T G	40	106	86
Berkshire				
Average		43·7	100·0	83·1

It will be noted from the above table that six sows (5 Yorkshires and 1 Berkshire) entered in the 1929 test, qualified. One Yorkshire and two Tamworths failed to qualify from a production standpoint. Seven of the fifteen sows had litters which were also low in maturity index. As regarding the slaughter test the performance of all the sows with the exception of two Berkshires was good.

Cost of Pork Production at Different Ages

In reviewing the growth and feeding data recorded in connection with the fifteen litters entered in Advanced Registry during the year 1930, information is available relative to the cost of producing pork during different feeding periods as well as the total cost for the full period.

The following table gives the information secured:—

COST OF PRODUCTION DURING DIFFERENT PERIODS

—		First 30 days from weaning	31 to 60 days	61 to 90 days	91 to 128·7	Total period
Number of pigs in experiment		109	109	109	109	10.
Initial weight, gross	lb.	3,455	6,315	10,035	14,975	3,455
Initial weight, average	"	31·7	57·9	92·1	137·4	31·7
Final weight, gross	"	6,315	10,035	14,975	21,800	21,800
Final weight, average	"	57·9	92·1	137·4	200·0	200·0
Average number of days on feed	days	30	30	30	33·7	128·7
Total gains for period	lb.	2,860	3,720	4,940	6,825	18,345
Average gain per hog	"	26·2	34·1	45·3	62·6	168·3
Average daily gain per hog	"	0·87	1·14	1·51	1·62	1·31
Meal consumed	"	9,132	13,938	18,695	30,174	71,939
Buttermilk consumed	"	15,110	14,185	20,310	34,379	83,984
Meal eaten per pound gain	"	3·19	3·75	3·78	4·42	3·92
Cost of meal mixture per hundred pounds	$	1 51	1 51	1 45	1 34	1 42
Buttermilk eaten per pound gain	lb.	5·28	3·81	4·11	5·04	4·58
Cost of buttermilk per hundred pounds	$	0 20	0 20	0 20	0 20	0 20
Total cost of feed including buttermilk	$	168 11	238 83	311 70	473 09	1,191 73
Cost of feed per head	$	1 54	2 19	2 86	4 34	10 93
Cost of feed per pound gain	cts.	5·88	6·42	6·31	6·93	6·50

NOTE.—The different rations used during the different feeding periods will be found under the heading "Testing Swine under the Advanced Registry Policy".

DEDUCTIONS.—It will be noted from the foregoing table that as the pigs grew older they required more and more feed for 100 pounds gain, with a resultant increase in cost of gain. It cost 5·88 cents per pound gain for the first thirty days, 6·42 cents for the second thirty days, 6·31 cents for the third thirty days, and 6·93 cents for the fourth thirty-eight, the total cost for the full period being 6·50 cents.

The average daily gain per hog started at 0·87 pounds for the first thirty days; 1·14 pounds for the second thirty days; 1·51 pounds for the third thirty days, and 1·62 pounds for the fourth 38·7 days, the average daily gain for the full period being 1·31 pounds.

FIELD HUSBANDRY

The results of experiments with cultural methods, fertilizers and farm rotations are reported under this Division. Unfortunately climatic conditions were such that results of cultural experiments were influenced so much that experimental data obtained during the current season would be misleading. For this reason it was deemed wise to not publish the data obtained in 1930. The reader is referred to page 28 of the 1929 annual report for information on cultural practices, rotations, etc. The data published in the 1929 report were obtained under normal conditions and were much more dependable than data secured in a year with abnormal climatic and soil conditions coupled with abnormal farm values.

The fertilizer tests conducted at the Experimental Station, Lacombe, in 1929 and 1930, were located on a level field of rich dark loam soil which was ploughed out of sod in the late fall of 1928. The high productiveness of this land is indicated by the high yields produced on the check plots located on the summer-fallowed land. The summer-fallowed check plots in each replicate and in the averages as well, indicate a greater productiveness in the soil as the plots progress down the field from 1 to 16.

It will be observed that in general the use of fertilizers resulted in an increase in the yield per acre. The relative yields per acre are more easily observed and compared in the column where the actual yields are converted into yield in per cent. Apparently the greatest increases resulted from the use of the different phosphates in plots 2 to 5. These increases show in both the summer-fallowed and stubble plots.

A 60-horsepower caterpillar brush cutter at work. This machine will clear 10 to 12 acres of brush land per day, and has been partly responsible for the increased area under cultivation in the park belt.

The application of barnyard manure did not give an increase in yield on the summer-fallowed land but apparently exercised a beneficial influence on the second crop following summer-fallow. An explanation for the results in the case of the summer-fallowed plots may be found in the fact that the land on which the experiment was conducted was in sod in 1928, hence a relatively large amount of humus and other plant food would be available.

Apparently the application of 2 tons of lime per acre resulted in an actual reduction in the yield per acre. The yields produced on the lime-treated plots bear out field observations, in that the grain growing on the lime-treated plots never appeared to be as vigorous or to make as rapid growth as either the checks, or plots treated with other fertilizers.

It will be noted that this land was very fertile as indicated by the high yield per acre produced by the check plots on summer-fallow. Had this land been less liberally supplied with humus or other plant foods the results from the use of fertilizers on the summer-fallowed plots would doubtless have been different. The yields on the stubble plots were limited by the available moisture. Had 1930 been a season with an average amount of precipitation, the relative yields produced would have had greater importance. Precipitation was so limited in 1930 that moisture exerted a greater influence than any other factor in crop production on stubble land.

AVERAGE YIELDS FROM DUPLICATE PLOTS PRODUCED IN FERTILIZER TESTS IN 1930, DOMINION EXPERIMENTAL STATION, LACOMBE

Plot No.	Fertilizer used	Wheat on summer-fallow, yield		Wheat on stubble, yield	
		bush.	%	bush.	%
1	Check—no fertilizer	43·5	100·0	13·8	100·0
2	100 pounds ammonium phosphate	52·3	117·3	17·0	115·5
3	100 pounds ammonium phosphate; 100 pounds potassium phosphate	53·3	116·1	17·1	107·1
4	100 pounds ammonium phosphate; 100 pounds superphosphate	58·6	124·5	18·6	111·2
5	100 pounds ammonium phosphate; 100 pounds superphospate and 100 pounds potassium phosphate	57·1	120·4	17·5	97·3
6	Check—no fertilizer	49·6	100·0	19·2	100·0
7	100 pounds potassium sulphate; 100 pounds superphosphate	53·0	102·9	16·0	83·6
8	100 pounds superphosphate	56·5	106·4	15·5	80·7
9	100 pounds ammonium sulphate	50·8	96·9	19·2	99·8
10	100 pounds potassium sulphate	60·3	107·6	19·1	98·7
11	Check—no pertilizer	57·0	100·0	19·3	100·0
12	10 tons rotted manure	57·5	100·7	20·4	109·6
13	10 tons rotted manure; 100 pounds superphosphate	60·6	101·1	21·3	113·4
14	2 tons lime	60·0	99·2	15·7	85·3
15	2 tons lime; 100 pounds ammonium phosphate; 100 pounds potassium sulphate; 100 pounds superphosphate	65·1	105·9	15·8	86·1
16	Check—no fertilizer	62·6	100·0	18·1	100·0

CEREALS

The season of 1930 was very unusual in that spring seeding was followed by a very dry period during which high winds did a lot of damage to cereal crops. The bare roadways and paths accentuated this damage in the plots, with the result that much of the work with cereals was either completely destroyed or injured so much that the data secured were of little value. Rod-row tests, pure line selections, verification plots for the Canadian Seed Growers' Association and the Dominion Seed Branch, as well as plant breeding material, were seeded on high early land which drifted badly and suffered more damage than the large one-fortieth-acre plots which were seeded on lower land in a more protected location.

The wheats included in this experiment were seeded on April 21 in quadruplicate plots. Yields and other data for 1930 are presented in the tables relating to this phase of the cereal work.

VARIETY TESTS WITH WHEAT, 1930

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on scale of 10 points	Weight per measured bushel after cleaning	Yield of grain per acre
			in.		lb.	bush.
Ceres	Aug. 21	122	30	10	62	38·8
Early Red Fife	" 26	127	36	10	63	48·5
Early Triumph	" 21	122	30	10	65	43·2
Garnet Ott. 652	" 17	118	30	10	63	38·8
Huron Ott. 3	" 23	124	37	10	61	40·2
Kitchener	" 26	127	36	10	61	49·8
Marquillo	" 22	123	29	10	62	42·7
Marquis Ott. 15	" 24	125	32	10	64	46·7
Red Bobs 222	" 22	123	30	10	64	46·2
Renfrew	" 27	128	38	10	62	51·7
Reward Ott. 928	" 18	119	27	10	65	34·7
Ruby Ott. 623	" 17	118	27	10	65	34·7
Supreme	" 23	124	30	10	62	46·0

WHEAT—AVERAGE YIELD FOR FIVE YEARS

Variety	Number of days maturing	Yield per acre
		bush.
Ceres	117	32·7
Early Red Fife Ott. 16	124	39·6
Early Triumph	118	44·2
Garnet Ott. 652	114	43·6
Huron Ott. 3	121	43·1
Kitchener	122	45·2
Marquis Ott. 15	122	42·9
Red Bobs 222	119	46·3
Renfrew	125	44·4
Reward Ott. 928	116	39·8
Ruby Ott. 623	113	38 2
Supreme	120	47·0

Data for both 1930 and the average of the past five years are given to enable the reader to more intelligently interpret the experimental results.

Experience gained in producing and marketing wheat indicates that yield is not the only factor to be considered in choosing a variety to grow. Quality is very important and should not be overlooked when making this selection. It is doubtful if a better variety than Marquis has yet been found for districts not subject to early fall frost or rust epidemics. It is true that certain varieties will outyield Marquis, other varieties are earlier maturing, while other sorts are slightly superior as a milling and exhibition wheat. Marquis is recognized as the standard milling wheat of Canada's domestic and export trade; and since it combines reasonably high yield, strength of straw and maturity with excellent quality, it would seem wise to continue producing this wheat in all districts where it will mature.

Reward is an excellent exhibition and milling wheat. While it produces slightly less per acre than some of our standard varieties, it will attain a higher commercial grade when grown in the park belt than other commercial varieties, and for these reasons will continue to replace these other sorts under such conditions. The impression prevalent among some growers that Reward is susceptible to infection with loose smut has not been substantiated by investigation. All that is necessary to grow a disease-free crop is to sow disease-free seed.

Many farmers in the park belt of Central Alberta maintain that Garnet is the best commercial wheat to grow at present; that in spite of the fact that it cannot at present attain the No. 1 grade, it will make them more money than any other sort. Garnet is undoubtedly the heaviest yielding variety of the early maturing wheats. It filled a long-felt want and appears to be holding its own against newer introductions. It would seem that Garnet and Reward will eventually replace other varieties in districts where an early maturing sort is necessary. Farmers growing wheat in such districts will decide between the slightly heavier yielding ability of Garnet as against the better quality of Reward.

The early maturing strains of Bobs, namely Supreme, Early Triumph, and Red Bobs No. 222, are among our heaviest yielding sorts. They undoubtedly have a place in our agriculture.

Varieties which are later maturing than Marquis appear to have no place in the portion of Alberta served by this Station.

Since rust epidemics have never been serious in the central and northern part of the province, rust-resistant varieties are not of special value here.

VARIETY TESTS WITH OATS

The varieties of oats included in this test were seeded on April 22 in quadruplicate plots. The season was very dry and no lodging occurred. Yields and other data are presented in the accompanying table:—

VARIETY TESTS WITH OATS, 1930

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on scale of 10 points	Weight per measured bushel after cleaning	Yield of grain per acre
			in		lb.	bush.
Abundance	Aug. 13	113	40	10	40	62·6
Alaska	" 6	106	28	10	38	42·4
Banner Ott. 49	" 14	114	41	10	37	66·8
Daubeney Ott. 47	" 6	106	28	10	37	40·9
Gold Rain	" 13	113	34	10	40	57·9
Gopher	" 9	109	27	10	37	40·6
Laurel Ott. 477	" 11	111	28	10	56	40·3
Leader	" 14	114	35	10	37	65·9
Legacy Ott. 678	" 11	111	32	10	37	67·9
Liberty Ott. 480	" 9	109	33	10	49	47·4
Longfellow Ott. 478	" 13	113	37	10	41	55·6
O.A.C. 144	" 17	117	40	10	36	65·0
Star	" 17	117	37	10	42	71·2
Victory	" 16	116	37	10	43	76·2
Victory x Alaska	" 15	115	35	10	38	66·5

OATS—AVERAGE YIELD FIVE YEARS

Variety	Days to mature	Yield
		bush.
Abundance*	114	67·4
Alaska	100	60·6
Banner Ott. 49	114	81·0
Daubeney Ott. 47	101	69·2
Gold Rain	111	74·4
Laurel Ott. 477	109	57·8
Leader	114	82·2
Legacy Ott. 678	109	78·2
Liberty Ott. 480	107	43·6
Longfellow Ott. 478	110	69·1
Victory	114	83·6

*Four-year average.

Banner and Victory constitute a large percentage of the oats grown in the province. The yields indicate that there is little to choose between these two sorts. The seasonal precipitation was such that Victory outyielded Banner in 1929 and 1930 sufficiently to place Victory over Banner in the five-year average. As a rule Banner outyields Victory here by several bushels per acre, in a year with a normal amount of precipitation. Banner has always been considered the best sort for the production of commercial grain and greenfeed, while Victory undoubtedly produces a superior-looking sample of threshed grain.

The early-maturing varieties such as Alaska, Daubeney, and Gopher are proving very valuable for certain agricultural needs. A number of fields in Central Alberta which were blown out or destroyed by cutworms in 1930 were seeded with Alaska oats as late as July 1 for oat greenfeed. Since the frost-free period in 1930 extended well into September, many of these fields produced matured grain. These very fine-strawed varieties produce greenfeed of exceptional quality and palatability and because they require a short season to attain sufficient maturity for greenfeed, make it possible to partially summer-fallow the land before seeding. When handled in this way, oat greenfeed constitutes one of the best cleaning crops used at this Station.

VARIETY TESTS WITH BARLEY

The different varieties of barley were seeded on April 22 in quadruplicate plots on land which was thoroughly summer-fallowed the previous season. Yield and other data are given in the accompanying table:—

VARIETY TESTS WITH BARLEY, 1930

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Strength of straw on scale of 10 points	Weight per measured bushel after cleaning	Yield of grain per acre
			in.		lb.	bush.
Barks	Sept. 1	131	26	10	50·0	42·9
Bearer Ott. 475	" 1	131	39	10	50·0	64·0
Canadian Thorpe	Aug. 27	126	36	10	50·0	67·3
Chinese Ott. 60	" 24	123	30	10	49·0	43·8
Duckbill Ott. 57	" 27	126	35	10	47·0	54·8
Feeder Ott. 567	" 17	116	32	10	55·0	33·7
Fenil Ott. 670	" 24	123	38	10	57·0	30·8
Gold	" 26	125	24	10	49·0	53·5
Hannchen	" 24	123	27	10	52·0	69·8
Himalayan Ott. 59	" 8	107	26	10	64·0	39·2
Junior Ott. 471	" 9	108	24	10	64·0	34·8
Manchurian Ott. 50	" 25	124	42	10	51·0	50·0
O.A.C. No. 21	" 24	123	37	10	50·0	50·0
Plumage Archer	Sept. 3	133	33	10	48·0	57·7
Star	Aug. 25	124	28	10	52·0	51·9
Trebi	" 23	122	30	10	48·0	62·7

BARLEY—AVERAGE YIELD FOR FIVE YEARS

Variety	Number of days maturing	Yield per acre
		bush.
Barks	116	39·8
Bearer Ott. 475	113	51·8
Canadian Thorpe	113	42·9
Chinese Ott. 60	106	39·7
Duckbill Ott. 57	112	36·7
Feeder Ott. 567	101	30·5
Fenil Ott. 670	103	25·8
Gold	113	40·7
Himalayan Ott. 59	99	39·9
Junior Ott. 471	99	39·8
Manchurian Ott. 50	108	45·5
O.A.C. No. 21	108	45·4
Trebi	105	56·7

A bumper crop of Elite seed of Banner oats. Elite seed of Banner and Victory oats, Marquis wheat, A.O.C. 21 and Trebi barley, and certified seed of Garnet and Reward wheat were produced for distribution.

Trebi is one of the heaviest yielding varieties tested at this Station. It is a little earlier maturing than O.A.C. No. 21 and similar sorts, and has a straw of medium length and strength. It is recommended where barley is being grown for feed but does not meet with favour in the brewing industry.

O.A.C. No. 21 is an excellent barley in that it produces good yields, has straw of good length and reasonably strong, and is favoured by the brewers.

Manchurian is similar to O.A.C. No. 21 in many respects such as yield, length and strength of straw, maturity, etc. It is approved by the brewing industry and is superior to O.A.C. No. 21 for exhibition purposes in that it has a yellow kernel, while the skin of the kernel of O.A.C. No. 21 is blue.

Duckbill and Canadian Thorpe are excellent show barleys of the two-rowed type. They are also approved by the brewing industry. While they have many commendable features, including strong straw, they lack somewhat in yield.

Hannchen is one of the best yielders of the two-rowed type.

FORAGE CROPS

The season of 1930 was unusual in many respects. In addition to being one of the driest in the history of the Station, when combined with that of 1929 it provided ideal conditions for the development of one of the most serious cutworm epidemics ever experienced in the district. The weather conditions were ideal for the moths to lay their eggs in the paths and roads around the 1929 seeded grass and legume plots. When these eggs hatched out in 1930, the young larvæ or cutworms completely destroyed all the grass and legumes seeded in 1929. In many cases alfalfa and sweet clover crowns were eaten as much as two inches below the surface. Any new shoots sent up from the roots were immediately eaten off. Unusually high winds during the period made it impossible to poison the cutworms. The yields of grasses and legumes were taken from plots seeded in 1928.

The first seeding of annual forages such as roots, sunflowers, millet, etc., was also destroyed and the stands from the second seeding reduced to the point where yields produced were of no value from an experimental standpoint. Corn withstood the damage from blowing better than other annual forage crops.

VARIETY TESTS WITH ALFALFA

The varieties of alfalfa reported were seeded on June 28, 1928, in quadruplicate one-hundredth-acre plots, without a nurse crop, on land which was treated as a summer-fallow before seeding. The 1930 cuttings were made on July 8 and August 26 respectively. Yields are given in the tables relating to the experiment.

RESULT OF VARIETY TESTS OF ALFALFA, 1930

Variety	Source	Hay yields, first cutting	Hay yields, second cutting	Total yield per acre
		tons	tons	tons
Baltic	Disco	2·55	2·67	5·22
Cossack	Disco	2·43	2·71	5·14
Cossack	Paramount Seed Farm, Alberta	2·49	2·35	4·84
Grimm	Alberta Alfalfa Seed Growers' Association, Alberta	2·31	2·41	4·72
Grimm	University of Saskatchewan	2·10	2·54	4·64
Grimm	A. B. Lyman	2·09	2·47	4·56
Medicago falcata	Paramount Seed Farm, Alberta	2·92	1·77	4·69
Ontario variegated	Peel County, Ontario	2·50	2·55	5·05

VARIETY TESTS OF ALFALFA—RESULTS FOR FIVE YEARS

Variety	Source	Yield of hay per acre					
		1926	1927	1928	1929	1930	Average
		tons	tons	tons	tons	tons	tons
Baltic	Disco	3·16	2·85	2·87	4·70	5·22	3·76
Cossack	Disco	3·02	2·83	2·55	4·51	5·14	3·61
Cossack	Paramount Seed Farm, Alberta	3·03	2·83	2·82	4·27	4·84	3·56
Grimm	Alberta Alfalfa Seed Growers' Assc., Alberta	2·93	3·11	2·52	3·94	4·72	3·44
				2·57	3·95	4·64	3·72
Grimm	University of Saskatchewan	.....	.....	2·27	3·63	4·56	3·18
Grimm	Lyman	2·54	2·90				
Medicago falcata	Paramount Seed Farm, Alberta	.....	.....	.....	2·19	4·69	3·44
Ontario variegated	Peel County, Ontario	.....	2·80	2·37	4·33	5·05	3·64

Alfalfa was the outstanding forage crop grown in 1930. In spite of the fact that 1929 and 1930 were two of the driest years on record, the alfalfa seeded in 1928 without a nurse crop produced phenomenal yields. Apparently the alfalfa roots were able to draw from the subsoil moisture stored previous to this dry period. These high yields substantiate the assumption that it is advisable to seed alfalfa without a cereal nurse crop.

VARIETY TESTS WITH SWEET CLOVER

The sweet clover plots seeded in 1929 were completely destroyed by cutworms. In spite of this, however, some interesting information was gleaned. The cutworms appeared to relish the white blossomed sweet clover better than

any of the other legumes or grasses, and ate the yellow blossom sweet clover only when everything else was cleaned up. The sweet clover roots, although kept eaten off below the ground for over a month, persisted and gave a crop similar to the second growth following the regular hay crop.

VARIETY TESTS WITH RED CLOVER

The red clover data reported in tabular form are the second year's yields of hay from plots seeded in 1928. The 1929 seedings, like other legumes, were destroyed by cutworms, but did not recover as was the case with alfalfa and sweet clover.

RESULTS OF VARIETY TESTS WITH RED CLOVER, 1930

Variety	Source	Per cent winter killing	First cutting, yield of hay per acre	Second cutting, yield of hay per acre	Total yield of hay per acre
			tons	tons	tons
Alfred	Ontario	22·3	0·37	1·43	1·80
Chateauguay	Quebec	47·5	0·31	1·57	1·88
Dauphine	S.E. France	100·0	.....	.....	.....
Early Swedish	Gen. Swedish Seed Company	51·2	0·89	1·07	1·96
Emilia	Italy	100·0	.....	.....	.....
Marche	North Central Italy	100·0	.....	.....	.....
Otofte	Royal Danish Agricultural Society	62·5	0·80	0·55	1·35
Spadone	France	100·0	.....	.....	.....
St. Clet	Quebec	55·0	0·20	1·14	1·34
Tystofte	Royal Danish Agricultural Society	27·5	0·40	1·68	2·08
Altaswede	University of Alberta	2·5	1·41	0·85	2·26
Kenora	Kenora District Co-operative	58·8	1·12	0·44	1·56
Late Swedish	General Swedish Seed Company	8·8	1·12	0·79	1·91
Mammoth	Ontario	50·0	0·24	1·35	1·59
Medium Late Swedish	General Swedish Seed Company	32·5	1·00	0·74	1·74

VARIETY TESTS WITH RED CLOVER—RESULTS FOR FIVE YEARS

Variety	Source	Yield of hay per acre					
		1926	1927	1928	1929	1930	5-year average
		tons	tons	tons	tons	tons	tons
Alfred	Ontario	2·82	.....	3·61	2·41	1·80	2·66
Chateauguay	Quebec	2·96	2·25	3·45	2·99	1·88	2·71
Early Swedish	General Swedish Seed Company	2·15	2·19	3·79	2·40	1·96	2·50
Otofte	Royal Danish Agricultural Society	.....	.....	3·15	0·85	1·35	1·78
St. Clet	Quebec	2·41	1·19	3·01	1·01	1·34	1·77
Tystofte	Royal Danish Agricultural Society	.....	.....	3·00	0·87	2·08	1·98
Altaswede	University of Alberta	2·27	2·75	2·16	2·21	2·26	2·33
Kenora	Kenora District Co-operative	2·11	2·69	2·34	1·67	1·56	2·07
Late Swedish	General Swedish Seed Company	1·83	2·61	2·30	1·17	1·91	1·96
Mammoth	Ontario	.....	.....	.....	1·89	1·59	1·74
Medium Late Swedish	General Swedish Seed Company	1·94	3·25	1·89	0·99	1·74	1·96

The variety tests with red clover provide some interesting studies. It will be observed that the varieties and strains of red which were produced in warmer climates are decidedly lacking in winter hardiness. Since their production over a series of years has been nil, they have been omitted from the table giving yields of hay for the past five years.

The Altaswede red clover, which is a strain of the Late Swedish variety of Mammoth or single cut red clover developed by the University of Alberta, appears to be best suited to the needs of this province. It is a perennial in habit

of growth, is one of the hardiest under test, and produces high yields of excellent feed. It is not 100 per cent winter hardy, as it will winter-kill badly following a season or fall with a decided shortage of moisture. It is the best red clover available in the seed trade for growing under Alberta conditions.

Red clovers do not produce very satisfactory results in the open plains section of the province where moisture is more or less limited, but are reasonably satisfactory in the park belt and particularly in the heavily timbered sections of the province where moisture is more plentiful.

VARIETY TESTS WITH WHITE DUTCH CLOVER AND ALSIKE

The varieties of White Dutch clover appear to be hardier than either alsike or red clover. They give an excellent crop when grown in moist locations or in wet seasons but give relatively low yields under dry conditions. It would seem that their principal use would be for pasture crops on rather moist locations, where they give excellent results if combined with other grasses and legumes.

Alsike is an excellent hay and pasture legume if used in combination with other grasses and legumes in a moist location.

The yields in tons per acre in 1930 were as follows: Alsike, 1·35; commercial (White Dutch), 0·28; Morso (White Dutch), 0·47; and Stryno (White Dutch), 0·67.

STRAIN TESTS WITH WESTERN RYE GRASS

Fourteen strains of Western rye grass were compared with commercial stock. The yields produced are presented in the accompanying table:—

RESULTS WITH WESTERN RYE GRASS

Variety or strain	Yield of hay per acre	
	1929	1930
	tons	tons
Commercial	2·67	2·93
Grazier	3·59	2·67
No. 8	4·12	2·85
No. 13	2·50	2·51
No. 15	1·84	2·90
No. 19	1·74	2·75
No. 25	2·96	3·03
No. 56	2·98	2·57
No. 77	2·91	2·77
No. 79	2·58	2·43
No. 80	2·69	2·80
No. 97	2·46	2·11
No. 100	3·07	2·47
No. 116	2·77	2·56

It will be observed that a number of the strains of western rye grass outyielded the commercial stock. One of these, Grazier, is already in the seed trade and may be purchased from a number of seed companies.

MISCELLANEOUS GRASSES

The yields produced by miscellaneous grasses in 1930 are the second year's hay and as a result are relatively lower than the first year's yields given in previous reports. They are interesting in that they show how quickly these grasses become unproductive as compared with the yields of rye grass just given. The three varieties of timothy yielded as follows: Boon, 1·43 tons; Huron, 1·64 tons; and commercial, 1·46 tons. Red Top give a yield of 0·60 a ton; Brome grass, 0·75 ton; and Kentucky Blue grass, 0·56 ton.

VARIETY TESTS WITH CORN

The varieties of corn were seeded on May 16 and were harvested on September 10. Yields and other data are given in the accompanying table:—

RESULTS OF VARIETY TESTS WITH CORN

Variety	Source	Dates of tasseling	Dates of silking	Green weight	Dry weight
				tons lb.	tons lb.
Amber Flint	Wimple	Aug. 6	Aug. 21	8 1,160	1 61
Dakota White Flint	O. Will	" 4	" 14	11 282	1 823
Early Canadian Yellow	Duprey and Ferguson	" 21	.....	10 930	1 407
Falconer	O. Will	" 4	" 14	11 750	1 748
Gehu North Dakota	McKenzie	" 4	" 14	8 1,160	.. 1,944
Golden Glow	Duke	" 27	.....	7 742	.. 1,790
Hybrid	Wimple	" 27	.....	9 902	1 176
Leaming No. 1	Duke	" 22	" 28	11 512	1 394
Longfellow	Duke	" 22	.....	8 1,862	.. 1,937
Minnesota No. 13 Haney St.	McKenzie	" 18	" 26	7 392	.. 1,803
N.W. Dent Crookstan	McKenzie	" 5	" 15	7 92	.. 1,889
N.W. Dent. South Dakota	McKenzie	" 6	" 15	9 1,370	1 700
N.W. Dent North Dakota	McKenzie	" 4	" 15	12 302	1 1,076
N.W. Dent Brandon	Experimental Farm, Brandon	" 4	" 15	5 212	.. 1,387
N. W. Dent	Disco	" 7	" 15	10 1,320	1 601
Twitchells Fride	Ottawa	" 4	" 15	9 1,682	1 452
White Cap Yellow Dent	Duke	" 22	.....	8 510	1 211
Wisconsin No. 7	Duke	" 22	.....	5 1,440	.. 1,342
Yellow Dent	Wimple	" 22	.....	12 752	1 810
90-Day White Dent	Disco	" 20	" 27	5 1,310	.. 1,313
N.W. Dent	Field Crops	" 4	" 14	10 1,060	.. 1,806

The reader's attention is drawn to a bulletin published during the current year entitled " The Production of Cheaper and Better Forage Crops for Central Alberta." This bulletin discusses the practical phases of forage crop production and briefly summarizes the experimental and practical experiences with forage crop production at this Station.

HORTICULTURE

Extensive experiments in horticulture are carried on at the Station, but in 1930 very serious injury from soil drifting and cutworms made it impossible to secure any reliable comparative yields.

The experiments have amply demonstrated that the bush fruits, black and red currants and raspberries, can be quite successfully grown. Gooseberries do well, but in wet years suffer some injury from mildew. In years of normal precipitation good yields of strawberries have been produced, but in dry years strawberries are a failure. All of the common garden vegetables can be quite successfully grown. With a hedge or shelter belt for protection a good farm garden can be produced with comparatively little work in Central Alberta.

In the large experimental grounds many varieties of trees and ornamental shrubs and thirty-two varieties of hedges are under test. Every year a profusion of bloom from many varieties of annual and perennial flowers is maintained from early June until freeze-up. A number of varieties of roses have been quite successfully grown.

The results of the twenty-two years' experiments in horticulture have been summarized in previous reports and bulletins which will be sent on request.

VARIETY TESTS WITH POTATOES

Twenty-one varieties of potatoes were tested in 1930. They were planted on May 15 and were dug on September 25. The five-year yields for the different varieties are given in the accompanying table:—

Variety	Yields per acre											
	1926		1927		1928		1929		1930		Average	
	Yield	Per cent marketable	Yield	Per cent marketable	Yield	Per cent marketable	Yield	Per cent marketable	Yield	Per cent marketable	Yield	Per cent marketable
	bush.		bush.		bush.		bush.		bush.		bush.	
American Wonder	588	98	475	73	310	87	243	91	320	87	387·2	87·2
Ashleaf Kidney	570	95	427	91	234	79	221	95	319	89	354·2	89·8
Bliss Triumph	.....	.....	453	76	236	75	213	87	248	82	287·5	80·0
Carter Early Favourite	583	87	388	68	321	66	207	75	190	45	337·8	68·2
Country Gentleman	.....	.....	472	89	310	81	189	73	330	83	325·2	81·5
Early Bovee	545	84	496	80	280	81	210	75	304	83	367·0	80·6
Early Hebron	591	93	459	87	269	78	221	78	329	87	373·8	84·6
Early Northern	.....	.....	535	86	308	83	269	82	308	82	355·0	83·2
Early Ohio	490	76	314	64	208	69	156	76	218	79	277·2	72·8
Early Vermont	506	97	451	77	284	71	259	80	256	75	351·2	80·0
Empire State	.....	.....	501	76	310	84	269	83	374	89	363·5	83·0
Everitt	592	93	488	86	137	82	241	90	302	85	352·0	87·2
Extra Early Eureka	542	65	453	75	321	87	285	86	286	81	377·4	78·8
Gold Coin	589	94	425	91	271	82	219	89	364	88	373·6	88·8
Gold Nugget	591	76	433	75	264	80	242	89	330	81	372·0	80·2
Grant Seedling	.....	.....	.....	.....	.....	.....	181	88	296	80	238·5	84·0
Green Mountain	513	95	496	84	282	84	262	89	356	89	381·8	88·2
Houlton Rose	.....	.....	466	83	327	81	249	84	360	86	350·5	83·5
Irish Cobbler	506	88	410	72	282	81	199	88	316	86	342·6	83·0
Netted Gem	.....	.....	449	79	191	65	154	87	236	66	257·5	74·2
Rural Russet	401	83	349	92	129	71	158	85	292	83	265·8	82·8

It will be observed that the average yield per acre for the five-year period 1926-30 is relatively high.

The Early Ohio is the earliest maturing variety under test. Its exceptionally fine table quality and early maturity make it one of the best early varieties for the home garden.

Bliss Triumph, Early Bovee, Early Vermont, Extra Early Eureka, Gold Nugget, and Irish Cobbler are all early potatoes and are high in table quality. Each variety has its supporters and meets certain demands in the potato trade.

Gold Coin is grown for the main crop at this Station. It is an excellent yielding variety of good quality.

Netted Gem is grown very extensively for the potato trade but is rather late maturing for Central Alberta, especially on the heavier types of soil.

Rural Russet produces beautifully shaped tubers that are smooth and have excellent eyes. This variety merits more attention than it has received to date.

The Experimental Stations produce a quantity of Certified Seed for distribution. This seed is all increased from tuber units and is of unquestionable merit with respect to freedom from disease and varietal purity. The prices charged for this seed are moderate.

POULTRY

The work carried on with poultry during 1930 was a continuation of experiments in breeding, feeding, and selecting for greater average egg production, better uniformity of egg size, and general improvement of the poultry industry in Central Alberta.

The farm flock, consisting entirely of White Wyandottes, totalled on December 31, 1930, 685 birds, including 64 hens, 496 pullets, and 125 male birds, most of which are cockerels which will be sold to farmers for breeding. This is an increase of 391 hens and pullets and 41 male birds over that reported at the conclusion of the previous year.

As outlined in our previous reports, special attention is given to pedigree breeding of White Wyandottes, the object being to demonstrate the possibilities of establishing a flock with a higher average egg production and at the same time to maintain good breed type, fertility, hatchability and large eggs.

BLOOD TEST FOR PULLORUM

In the fall of 1930 the entire flock, consisting of males kept for breeding purposes, pullets and adult females, was tested for bacillus pullorum. This disease, which is also known as bacillary white diarrhœa, is responsible for much of the high death rate among chicks. The eggs from infected birds carry the organism of the disease and the chick is affected before hatched.

Preventive measures consist in using birds free from disease as breeding stock.

The samples of blood were forwarded to Lethbridge, where Dr. L. M. Heath, Pathologist at the Dominion Veterinary Research Station, made the tests. The results of the test showed that of the 600 birds tested there were only 7 reactors. Of the 234 birds tested in 1929 there were 9 reactors, and of the 282 birds tested in 1928 there were 41 reactors. The 17 males tested came through 100 per cent clean. Of the 64 hens tested, 2 reacted, or 3·12 per cent; of the 519 pullets tested, 5 reacted, or less than 1 per cent. All of the reacting birds have been removed from the flock and killed. While the percentage of infected birds was small, further tests will be made in order to keep the flock free from this disease.

HATCHING RESULTS

Artificial incubation is employed for all hatching. The results for the season were as follows:—

Total eggs set	4,186
Number fertile	3,282
Per cent fertile	78·40
Number of chicks	2,100
Per cent total eggs hatched	50·2
Per cent fertile eggs hatched	64·0
Number of chicks alive when wing banded	1,465
Per cent chicks hatched, alive when wing banded	69·8
Total eggs required for one chick hatched	2·0
Total fertile eggs for one chick hatched	1·6
Total eggs required for one chick when wing banded	2·9

CORN VS. BARLEY FOR LAYERS

An experiment has been conducted for six years for the purpose of determining if barley is a satisfactory substitute for corn in the grain ration of laying pullets for winter egg production. Eighty White Wyandotte pullets were used. They were divided equally as to size and general development into two pens of forty birds each. The grain feeds in one pen were the standard scratch and the standard mash, both containing considerable corn, while in the other pen the corn was left out of the scratch and mash and barley and barley meal substituted. The scratch feed was fed in the litter and the mash was fed dry in a hopper and was always available. This experiment is conducted from November to May and the results of the 1929-30 feeding test, also a six-year average, are given in the following table:—

RESULTS FROM CORN AND BARLEY

Feeds under test	Total eggs laid	Total feed cost	Value of eggs	Average eggs per bird	Cost per dozen	Cost per bird	Profit over feed cost	Profit per bird over feed cost
		$	$		cts.	$	$	$
Corn	3,800	32 62	98 17	95·0	10·30	0·815	65 55	1 64
Barley	3,150	23 97	81 37	78·7	9·13	0·599	57 40	1 43
Five-year average, basis of 10 birds:								
Corn	786	10 31	21 60	78·6	17·2	1·031	11 28	1 12
Barley	670	7 71	18 46	67·0	14·8	0·771	10 75	1 07

The preceding table shows that the birds receiving the corn in the rations produced considerably more eggs, but on account of the high cost of the corn as compared with barley the cost per dozen of eggs produced was on the average 2·4 cents in favour of the barley-fed pen.

TEST OF HULLESS BARLEY FOR LAYING PULLETS

In order to obtain further information relative to the value of hulless barley in the mixture of grain for scratch feed, and of hulless barley meal in the dry mash for laying pullets, this test has been repeated again this year. Two pens consisting of ten birds each were used. The ration for one pen contained hulless barley in the scratch grain and hulless barley meal in the mash, while the ration for the other pen contained common barley in the scratch grain and common barley meal in the mash. This experiment is conducted from November to May and the results of the 1929-30 feeding test, also a two-year average, are given in the following table.

RESULTS OF HULLESS VS. COMMON BARLEY TEST

Feed under test	Mash	Scratch grain	Grit	Value of feed	Number of eggs laid	Feed cost per dozen
	lb.	lb.	lb.	$		cts.
Hulless barley	153	235	26·0	5 61	848	7·9
Common barley	211	250	21·0	6 70	976	8·2
Two-year average, basis of 10 birds—						
Hulless barley	190	267	17·5	8 30	688	16·4
Common barley	203	270	17·5	8 43	704	18·1

The figures from this experiment in 1929-30 show that the pen given common barley produced a total of 128 more eggs than the hulless barley-fed pen. Over a two-year period the number of eggs laid and the feed cost per dozen are practically equal, which would seem to indicate that farmers who have a supply of common barley would not benefit materially by using hulless barley for their poultry.

COMMERCIAL VS. HOME-MIXED SCRATCH GRAIN

In order to obtain data on the relative value of home-mixed and commercial scratch grain and the cost of egg production from each, an experiment was conducted this year with two pens of White Wyandotte pullets. Birds as uniform in age, breeding, and as closely related as possible were equally divided in number and placed in each pen in order to overcome as far as possible experimental error. Ten pullets were used in each lot. They were fed for comparison from November 13, 1929, to May 1, 1930. The commercial grain used was the "Capital Scratch Grain" and the home-mixed grain consisted of two parts of whole wheat and one part of whole corn. All the pullets received the standard mash ration and grit and water. The scratch feed was fed in the litter. The mash was kept before the birds in the self-feeder and all other conditions were identical. The results are shown in the following table:—

RESULTS OF COMMERCIAL VS. HOME-MIXED GRAIN TEST

Feed under test	Grain	Mash	Grit and shell	Value of feed	Number of eggs laid	Feed cost per dozen
	lb.	lb.	lb.	$		cts.
Commercial grain	269	199	21	11 20	781	17·2
Home-mixed grain	258	155	22	7 70	875	10·6

Average cost of feed per cwt.: Commercial grain, $2.35; home-mixed grain, $1.47; mash, $2.24; grit and shell, $2.

From a study of the preceding table it may be noted that the home-mixed grain produced a total of 94 more eggs on 55 pounds less feed than did the commercial grain. Hence the cost per dozen of eggs produced is decidedly in favour of the home-mixed grain. It will be necessary to continue the experiment in order to arrive at definite conclusions.

BUTTERMILK VS. BEEF SCRAP

The object of this experiment is to determine the relative value of beef scrap vs. buttermilk when added to the laying ration. The pens were made up of ten birds each as uniform in breeding and type as it was possible to select them.

Pen No. 1 received beef scrap in the hoppers which were before the birds at all times. The following rations were fed from November 13, 1929, to May 1, 1930: Grain mixture: 200 pounds wheat, 100 pounds whole corn; dry mash: 100 pounds shorts, 100 pounds oat flour, 100 pounds corn meal, 98 pounds beef scrap, 15 pounds bone meal, 7·5 pounds charcoal, and 5 pounds salt.

Pen No. 2 received the same grain and dry mash mixtures as pen 1, but buttermilk was supplied in the place of beef scrap. The results were:—

RESULTS OF BUTTERMILK VS. BEEF SCRAP TEST

Pens	Mash	Scratch grain	Grit and shell	Butter-milk	Value of feed	Number of eggs laid	Cost per dozen
	lb.	lb.	lb.	lb.	$		cts.
Pen 1—Beef scrap	155	258	22	.....	7 70	875	10·6
Pen 2—Buttermilk	162	253	25	900	8 76	818	12·8

The results indicate that beef scrap was slightly superior to buttermilk from the standpoint of egg production. The cost per dozen of eggs produced was 2·2 cents per dozen in favour of the beef scrap. The test is being repeated to verify results.

BEEF SCRAP VS. FISH MEAL

A test was made to determine the value of these two protein supplements for laying pullets. The standard mash was used in each pen, with the exception that the fish meal replaced the beef scrap in one case.

RESULTS OF BEEF SCRAP VS. FISH MEAL TEST

Feeds under test	Total cost of feed per bird	Eggs laid per bird	Value of eggs	Feed cost per dozen	Returns per bird over cost of feed
	cts.		$	cts.	$
Beef scrap	77	87	2 25	10·6	1 48
Fish meal	82	86	2 22	11·4	1 40

From a study of the preceding figures it may be noted that the cost of producing a dozen eggs was slightly lower from the pen receiving beef scrap, but the difference is so slight that it is insignificant. The test is being repeated.

COMMERCIAL VS. HOME-MIXED MASH

In order to determine the relative value of home-mixed and commercial mash an experiment was conducted this year with two pens of White Wyandotte pullets. They were fed for comparison from November 13, 1929, to May 1, 1930. The commercial mash used was the "Capital Laying Mash" and the home-mixed mash was made up as follows:—

	pounds
Shorts	100
Oat flour	100
Corn meal	100
Meat scraps	98
Bone meal	15
Charcoal	7·5
Salt	5

The protein content of the meat scrap was 60 per cent. Sufficient meat scrap was used to make up an amount of protein equal to that given in the commercial mash, so that all conditions were identical.

Both pens were fed scratch grain consisting of two parts of whole wheat and one of whole corn. The scratch feed was fed in the litter and the mash was fed dry in a hopper and was always available. The birds had free access to grit and water. Ten pullets were used in each lot. The results are as follows:—

RESULTS OF COMMERCIAL VS. HOME-MIXED MASH TEST

Feed under test	Mash	Scratch grain	Grit and shell	Value of feed	Number of eggs laid	Feed cost per dozen
	lb.	lb.	lb.	$		cts.
Commercial mash	144	242	24	7 78	853	10·9
Home-mixed mash	155	258	22	7 70	875	10·6

Average cost of feed per cwt.: grain, $1.47, commercial mash, $2.60; home-mixed mash, $2.24; grit and oyster shell, $2.

In comparing the figures in the preceding table it will be seen that so far as feed cost per dozen goes there is practically no difference between the commercial and home-mixed mash, with a total of only 22 eggs more in favour of the home-mixed mash. The test is being repeated to verify results, as our data indicate that it is preferable not to place too much dependence on one year's results.

BEST DATE FOR INCUBATION

To determine the best date for incubation with regard to fertility, hatchability and livability, eggs are set during March, April, May, and June and records kept of the results of fertility, hatchability and mortality of chicks to six weeks of age for each month. This project has been continued for seven years and a summary of results are given below:—

Results of Best Date for Incubation Test

Year	March				April				May				June			
	Total eggs set	Per cent fertility	Per cent fertile eggs hatched	Per cent alive at six weeks	Total eggs set	Per cent fertility	Per cent fertile eggs hatched	Per cent alive at six weeks	Total eggs set	Per cent fertility	Per cent fertile eggs hatched	Per cent alive at six weeks	Total eggs set	Per cent fertility	Per cent fertile eggs hatched	Per cent alive at six weeks
1924	530	38·3	75·86	92·85	504	45·04	70·92	88·7	407	28·5	83·61	50·5	264	36·36	20·83	55·0
1925	647	78·68	40·1	89·1	1,105	65·02	33·2	70·1	711	69·76	43·34	94·6	543	54·69	49·83	100·0
1926	625	73·9	37·22	65·1	1,068	71·5	49·21	81·4	508	62·2	39·8	54·8		None	set	
1927	937	70·1	44·8	96·6	847	79·3	55·5	98·7	905	75·9	45·8	58·1	630	79·8	43·3	22·8
1928	890	60·0	45·5	90·1	1,414	70·2	43·4	54·3	973	61·5	38·9	83·7		None	set	
1929	417	52·9	47·5	88·5	1,554	56·9	51·1	78·5	1,107	57·5	50·1	60·4	821	57·6	49·05	21·6
1930	1,701	80·9	61·8	77·2	1,594	84·9	67·2	57·6		None	set			None	set	
Average	821·0	65·0	50·4	85·6	1,155·1	67·6	52·9	75·6	768·5	59·2	50·3	67·0	564·5	57·1	40·7	49·8

From the summary it may be noted that the best hatching results were obtained during March and April. The hatching results for May were slightly below the average of the other two months. The mortality in June hatched chicks was very high, partly for the reason that in very warm weather it is impossible to properly regulate the brooder temperatures. June hatched chicks also lacked vitality and were unsatisfactory as layers.

In order to take advantage of the high egg prices during the fall and winter months, pullets should be hatched in March and April so that they will be well matured at seven months of age before the short days and colder weather in November. In addition to greater egg profits, early hatched cockerels are more profitable as market poultry than those hatched late.

BREEDING FOR FERTILITY, HATCHABILITY AND LIVABILITY

In order to determine the advantage of using eggs from hens for hatching instead of eggs from pullets during their first year's production, a number of eggs from each source have been used and a record kept of the different results noted each year for the past seven years at this Station. The results are as follows:—

HATCHING RESULTS OF HENS VS. PULLETS

Year	Hens				Pullets			
	Total eggs set	Per cent fertile	Per cent fertile eggs hatched	Per cent alive at 6 weeks	Total eggs set	Per cent fertile	Per cent fertile eggs hatched	Per cent alive at 6 weeks
1924	1,430	37·83	70·42	83·46	475	33·00	59·23	65·59
1925	1,656	65·45	37·45	62·03	1,350	73·25	42·16	74·92
1926	1,725	71·88	44·91	72·89	835	62·27	30·76	72·5
1927	1,199	77·3	47·7	69·8	2,220	77·08	48·3	71·74
1928	1,178	63·7	47·1	66·6	2,482	59·3	48·2	81·0
1929	1,329	66·5	57·7	76·7	2,570	56·1	42·5	50·3
1930	783	71·4	69·1	75·5	3,403	79·6	64·1	68·5
Average	1,328·6	64·9	53·5	72·4	1,904·8	62·9	47·9	69·2

NOTE.—The results indicate that eggs from mature hens are more satisfactory than eggs from pullets for hatching. It is worthy of note that the hens, on the average, laid larger eggs, which hatched into larger and stronger chicks than those laid by the pullets.

COST OF PRODUCTION OF CHICKS TO FIVE MONTHS OF AGE

Records were kept again this year of the eggs, fuel and feed required to hatch and rear chicks to approximately five months of age. No allowance, however, was made for labour, interest and depreciation on buildings. The figures that follow cover chicks hatched and reared as follows:—

Number of eggs set	4,186
Number of chicks hatched	2,100
Number of chicks alive July 1, 1930	1,298
Number of chicks alive October 1, 1930	931

STATEMENT OF COSTS

3,282 fertile eggs at $1.50 per setting of 15	$	328 20
904 infertile eggs at 25 cents per dozen		18 85
8,000 pounds coke at $13 per ton		52 00
2,500 pounds coal at $8 per ton		10 00
700 pounds chick starter (mash) at $5 per cwt		35 00
400 pounds chick feed (grain) at $4 per cwt		16 00
8,500 pounds growing mash $2.30 per cwt		195 50
4,500 pounds cracked corn at $2.20 per cwt		110 00
75 bushels wheat at 60 cents per bushel		45 00
Total cost of rearing 931 chicks to five months of age	$	810 55
Average cost per chick		0 87

From the summary it may be noted that the average cost per chick at the end of approximately five

From the summary it may be noted that the average cost per chick at the end of approximately five months was 87 cents for 1930. The average cost of 810 chicks during the same period in 1928 was 85·4 cents and the average cost of 658 chicks during the same period in 1927 was 86·2 cents.

The following table shows only the cost of egg production and returns from eggs at market prices and does not take into consideration the increase in the flock, the sales of cockerels, laying stock, hatching eggs, market fowl, etc.

MONTHLY STATEMENT OF EGG PRODUCTION, FEED CONSUMED, PROFIT AND LOSS ON WHITE WYANDOTTES BRED AND RAISED AT THE DOMINION EXPERIMENTAL STATION, LACOMBE, ALBERTA, FOR THE LAYING YEAR NOVEMBER 1, 1929 TO OCTOBER 31, 1930

—	Number of birds	Eggs laid	Average per bird	Average price per dozen	Total market value	Feed consumed				Total cost of feed	Cost to produce 1 dozen eggs, labour neglected	Profit on 1 dozen eggs, labour neglected	Loss on 1 dozen eggs, labour neglected	Total monthly profit	Total monthly loss
						Grain	Mash	Grit and oysters shell	Buttermilk						
1929				cts.	$	lb.	lb.	lb.	lb.	$	cts.	cts.	cts.	$	$
November	211	2,328	11·03	40	77·60	759	625	79	150	27 04	13·9	26·1	.....	50 56	.....
December	207	2,374	11·46	43	85 07	713	690	77	150	27 78	14·0	29·0	.....	57 29	.....
1930															
January	155	1,728	11·14	40	57 60	592	458	56	150	20 38	14·2	25·8	.....	37 22	.....
February	151	1,915	12·68	25	39 90	530	394	56	150	18 15	11·4	13·6	.....	21 75	.....
March	150	2,618	17·45	20	43 63	575	445	56	150	19 84	9·1	10·9	.....	23 79	.....
April	140	2,677	19·12	20	44 62	510	414	52	150	18 11	8·1	11·9	.....	26 51	.....
May	128	2,087	16·3	20	34 78	451	416	48	.....	16 91	9·7	10·3	.....	17 87	.....
June	110	1,790	16·27	18	26 85	346	375	41	.....	14 31	9·6	8·4	.....	12 54	.....
July	106	1,353	12·76	20	22 55	376	351	39	.....	14 17	12·6	7·4	.....	8 38	.....
August	90	1,225	13·61	18	18 37	353	267	33	.....	11 83	11·6	6·4	.....	6 54	.....
September	90	1,056	11·73	20	17 60	362	243	33	.....	11 42	13·0	7·0	.....	6 18	.....
October	63	292	4·63	25	6 08	236	171	23	.....	7 94	32·6	.....	7·6	.....	1 86
Totals	.....	21,443	.....	.....	474 65	5,803	4,849	593	900	207 88	.....	.....	.....	268 63	1 86

Average cost of feed per cwt.: Grain, $1.47; mash, $2.24; grit and oyster shell, $2; buttermilk, 20 cents. Net gain over cost of feed, $266.77.

The figures in the preceding table reveal the fact that it takes fewer eggs from November to March to pay for a given quantity of grain than during any other time of the year. Therefore, the greater the egg production during the fall and winter the greater are the profits. What the poultryman or farmer should realize above all else is that, although they cannot control the price of grain or the price of eggs from season to season, they can control production, at least to a considerable extent.

BEES

The summer of 1930, though not very satisfactory for the production of an exceptionally good crop of high grade honey, was nevertheless quite an improvement on that of the previous year. The weather for the months of May and June was not at all favourable for brood raising, being cool with considerable

Bees are a profitable side line of farming. Note the number of supers on some of these colonies. Yields as high as 300 pounds of extracted honey from one colony have been produced.

wind, thus hindering the bees from gathering much pollen or nectar, the result being that the bees were slow in building up their strength for the main flow. Better weather began about July 7, when the main honey flow started. The bees continued bringing in nectar, until about August 14, when wet windy weather caused activities to cease for about a week. After the 30th of the month no further gains were made. The colony on scales showed a daily loss from then until they were placed in winter quarters. Although the honey flow was rather short, the colonies having to depend almost entirely upon wild flowers and a little White Dutch and alsike clover, they made a fair showing, the average amount of honey produced being 87·5 pounds per colony. Had there been fewer colonies of bees in the apiary, as would be the case on the average farm, the yields would have been much higher.

The number of colonies at this Station (summer count) was forty. Where this number of colonies is kept, special pasture should be provided. The highest

daily gain was made on July 15, when the hive on scales increased 14 pounds in weight. The highest yield from one colony was 187 pounds. The principal sources of nectar in the early building up period were dandelions, some caragana, White Dutch clover and some fruit bloom. For the main flow, the source was alfalfa, alsike clover and some wild flowers, the usual main source of nectar, sweet clover, being missing this year.

None of the colonies were requeened in 1929, so that most of the queens were on their second and some were on their third year. This may be the reason why so many attempts at swarming were made. The results of several projects are given below.

METHODS OF WINTERING BEES

The object of this experiment is to determine which method of wintering bees is most satisfactory for central Alberta. Data on this experiment will be found in the accompanying table.

METHODS OF WINTERING BEES

Cellar			Kootenay case			Four colony case			Two colony case		
Colony No.	Yield	Frames of bees when first examined	Colony No.	Yield	Frames of bees when first examined	Colony No.	Yield	Frames of bees when first examined	Colony No.	Yield	Frames of bees when first examined
	lb.			lb.			lb.			lb.	
19	73·5	5	37	144·0	6	52	187·0	9	29	127·0	7½
38	109·0	3	16	141·0	4½	15	173·0	7	8	10·0	1½
22	106·5	5	21	119·0	2½	31	147·0	9	7	19·0	2½
36	72·5	6	33	116·0	4	47	118·0	9	25	Nil	7
Average, 90·4 pounds			Average, 130 pounds			Average, 156·3 pounds			Average, 52 pounds		

N.B.—Nos. 25, 7 and 8 got rather a bad soaking in the case, owing to snow getting in under a poorly fitting lid during the winter.

PROTECTED VERSUS UNPROTECTED HIVES DURING THE SUMMER

The objects of this experiment are to determine whether a colony of bees which is protected during the summer months will produce a larger yield of honey than one which received only such protection as may be afforded by windbreaks, and if possible to decide how much protection is necessary.

Eight colonies were included in this experiment, three of them in Kootenay cases. Additional lifts were placed on the Kootenay cases as supers were added to the hives during the honey flow, thus providing a four-inch space between the hive and the outside case, and protecting both brood nest and supers. The brood nest only of one colony was protected by a four-inch packing of cut straw, while the other four colonies, used as a check, received no protection other than that afforded by the usual 10-frame Langstroth hive, and the windbreak which surrounds te apiary.

PROTECTED VERSUS UNPROTECTED HIVES DURING THE SUMMER

Number of colonies in group	Type of protection	Average yield of honey per colony
		lb.
	Kootenay case	134·6
	Protected brood nest	106·0
	No protection save windbreak, etc.	90·4

This and previous experiments seem to show that summer protection will increase yields. It would be well to note that the colony having the brood chamber only protected, attempted to swarm, and gave a lower yield than did those in the Kootenay cases. Although in 1928 this was the reverse, it was put down to the fact that this particular colony was then headed by an exceptionally prolific queen. It was observed that the additional protection helped materially in producing a higher yield of honey, and apparently helped to keep the bees from clustering on the outside of the hive during the hot summer days, as do those belonging to the unprotected colonies. The hives not exposed to the direct rays of the sun appear to make it easier for the bees to keep them properly ventilated thus eliminating unnecessary expenditure of energy in repeated preparations for swarming.

COMPARISON OF DIFFERENT SIZES OF HIVES

A comparison was made in order to ascertain the relative merits of the two different sized hives now in general use, the 10-frame Langstroth and the Jumbo.

In 1926 the Jumbo hives gave a slightly higher yield of honey. The 10-frame Langstroth hives gave slightly higher yields in 1927-28-29-30.

The chief disadvantage of the Jumbo hive is weight. A Jumbo super when filled with honey weighs at least 100 pounds, and a super this weight, is far too heavy for the ordinary person to manipulate with ease. The frames of the 10-frame Langstroth are not interchangeable with those of the Jumbo. The Jumbo brood chamber is better for an unusually prolific queen, as it provides more room for her to lay, but on the other hand, the Langstroth brood chamber, with the addition of the shallow super, not only provides ample room for an ordinary queen, but is a very valuable asset in the detection of preparation for swarming.

METHOD OF DETECTING PREPARATION FOR SWARMING

The object of this experiment is to find out if it is possible to detect swarm preparations by the use of a double brood chamber, thus reducing the time required for examination.

At the beginning of the month of June, a shallow super was placed over the brood chambers of all strong colonies. Four of these were kept under close observation. A queen excluder was placed between these shallow supers and the honey supers added. Preparations for swarming were in all cases easily detected by tipping the shallow super and noting whether or not queen cells were present along the bottom bars of the frames. In one case only queen cells were discovered in the lower brood chamber. These cells were left untouched and later proved to be supersedure cells.

It was also noted in this experiment that the use of the shallow super in conjunction with the 10-frame Langstroth brood nest helped to keep the bees from swarming. This may be partly due to the fact that the addition of a shallow super to the brood chamber helps to provide ample room for the queen to lay.

SWARM CONTROL BY DEQUEENING AND REQUEENING

This project was designed to ascertain whether swarming may be both easily and effectively controlled by a method of dequeening and requeening.

Two colonies found to be making preparations for swarming were treated by the removal of the queens. Ten days after the queens were removed these colonies were again examined and all queen cells but one destroyed, one cell being left with one colony, so it could requeen itself, the other colony being given a laying queen. Both colonies did exceptionally well, producing 360 pounds of honey between them. It was noted that the swarming impulse seemed to be effectually controlled, and no further preparations for swarming were made

during the summer. No doubt if it had been possible to requeen both colonies, with good laying queens immediately after the second destruction of queen cells the yield would probably have been still higher.

SUMMARY REPORT ON COMPARISON OF RACES OF BEES

This experiment was started in 1926, the object being to compare Carniolan, Caucasian and Italian bees, as honey gatherers, for hardiness, resistance to disease, prolificacy, and tendency to swarm. Four colonies of each race were started from three-pound packages. To these three-pound packages were added queens of pure breeding of the different races. On June 16 of that year these colonies were placed in an out apiary 17 miles from this Station, and visited regularly. In 1927 the colonies were brought back to the Station and included in the apiary, where they have remained until the present time, the experiment being completed in the fall of 1929. It was not carried for the fifth year for two reasons: experimental results were decidedly in favour of the Italians which, combined with the fact that carrying the Carniolans and Caucasians in the apiary resulted in a high percentage of hybrid queens raised and a very marked mixing of the three races of bees in the apiary. These reasons were considered sufficient justification for discontinuing the project. The results of this four-year experiment will be found summarized in the accompanying table.

COMPARISON OF RACES OF BEES

Year	Race	Number colonies in group	Amount of honey produced	Average per colony	Number of combs drawn
			lb.	lb.	
1926	Italians	4	220	55	87
	Caucasians	4	80	20	56
	Carniolans	4	50	12	46
1927	Italians	3	372	127	60
	Caucasians	3	342	114	45
	Carniolans	3	285	95	45
1928	Italians	4	710	178	.....
	Caucasians	4	631	158	.....
	Carniolans	4	584	146	.....
1929	Italians	2	221	110	.....
	Caucasians	2	226	113	.....
	Carniolans	2	119	59	.....

Claims have been made to the effect that the Carniolan and Caucasian bees are very docile and easy to handle, and also that the Carniolans will work at a lower temperature than will either of the other races. Observations indicate that such is not the case. It has also been found that Carniolans and Caucasians are far more prone to swarm than the Italians.

In summarizing this experiment it would seem that the Italian race of bees are better honey producers, more docile, and just as hardy as the Carniolan or Caucasian. The Italians appear to be much less inclined to swarm than either of the others. Colonies developed from hybrid queens were very prolific and high producers, but were very cross and difficult to handle.

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